ENGINEERING NEWS-RECORD

MAY 3, 1945

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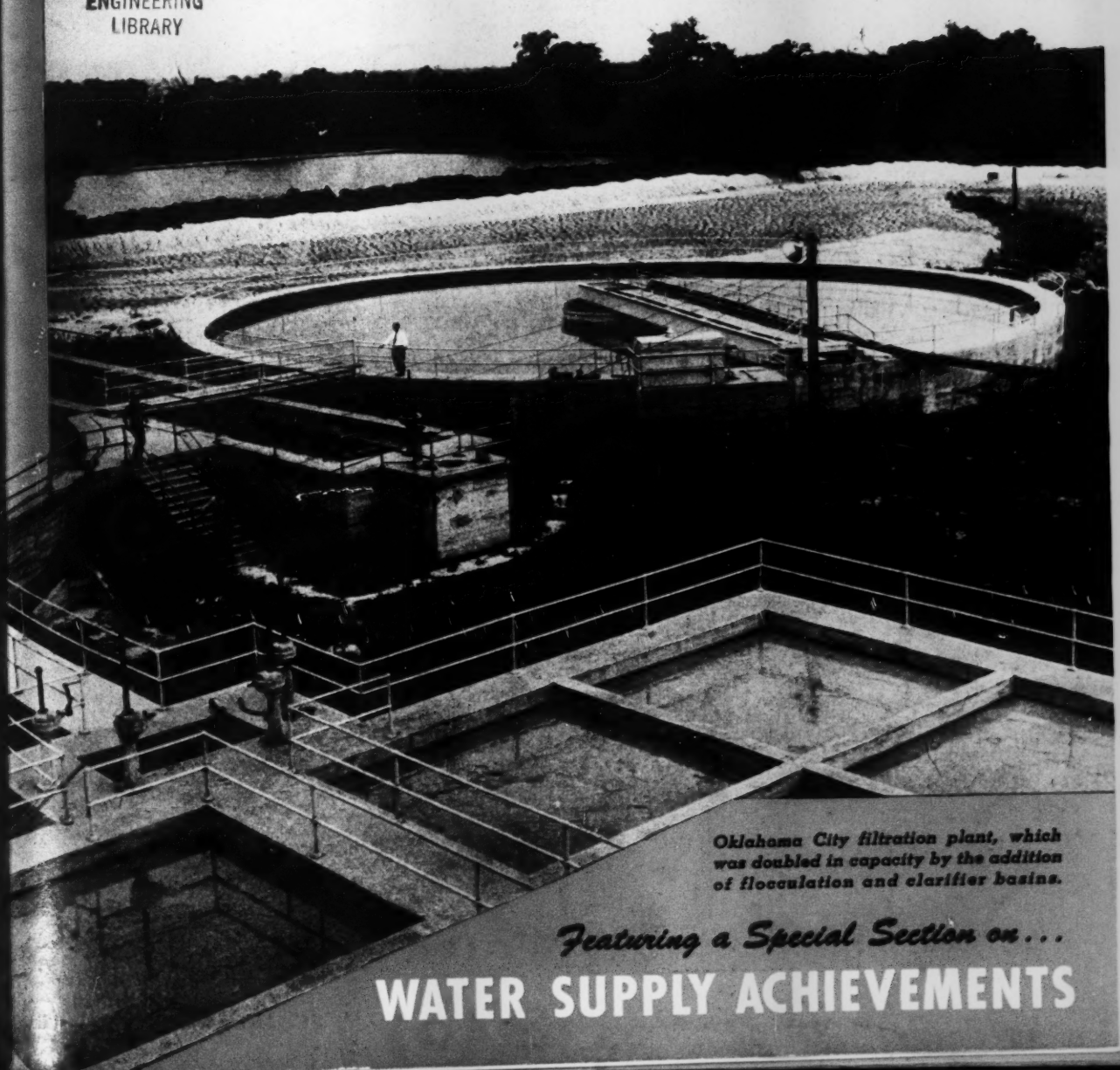
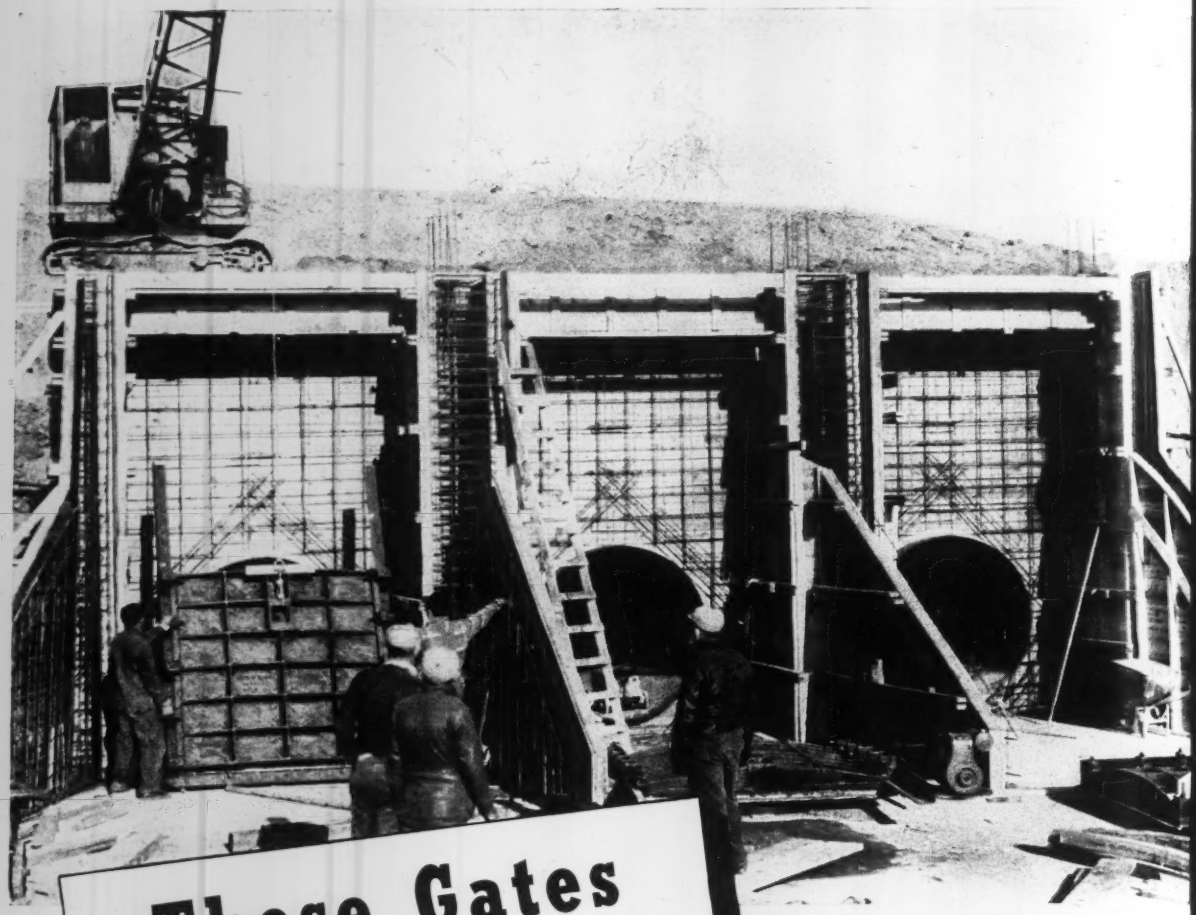


Oklahoma City filtration plant, which was doubled in capacity by the addition of flocculation and clarifier basins.

Featuring a Special Section on . . .

WATER SUPPLY ACHIEVEMENTS



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Levee openings for tributary streams a sewer outfalls need protection agai high backwater from the main streams.

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JOHN ABBINK, *Publisher*

WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Manager*

Vol. 134 MAY 3, 1945 • No. 18

COMING NEXT

• When the battle to reach the Rhine was begun on Feb. 23, the Commanders of the American armies could look backward at their supply lines with confidence. For, within 5 to 10 miles of their D-Day positions, all along the 30-mile front, were railheads. This accomplishment was made possible by one of the highest-pressure bridge-building programs in history. In the May 17 issue Waldo Bowman will cover this outstanding work by American engineer units.

• A concrete dam is being built at Las Virgenes, Mexico, with heads of 5-ft. thick buttress walls, mushroomed to a width of 29½ ft., instead of the usual flatslab deck construction. Calculations checked by photoelastic tests produced a design without stress concentrations or tensile stresses. This design, with the use of low-heat cement and a method of concreting the buttress walls to prevent cracking, eliminated the necessity of using steel reinforcement. The project will be featured in the May 17 issue.

• A 24-in. dia. natural gas pipeline from Texas to near Pittsburgh was built in 10 months. For the first time on a major pipeline project "solid phase" or pressure oxyacetylene welding was used extensively for joining the line, which resulted in a reduction of time, a saving in equipment and manhours required for construction. Unique methods were used for aerial crossing of rivers, and other important features, which will be described in the May 17 issue.

LOOKING AHEAD

• Precast concrete forms, eliminating the use of steel shapes, were set deep underwater to confine tremie placed concrete for walls and floors on three graving docks at San Francisco. Gantries spanning the work handled the precast forms and supported the tremie pipes. They also carried circular saws for uniform underwater cutting of foundation piles. The tremie placing method used resulted in subaqueous concrete equal in quality to that poured in the dry. The project will be discussed in an early issue.

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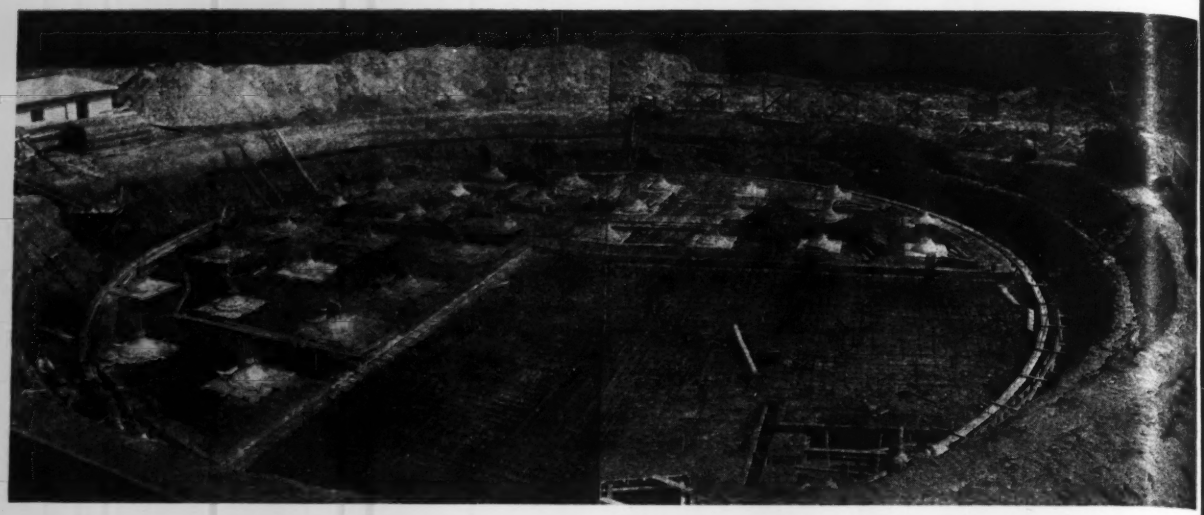

MORETRENCH WELLPOINTS LOWER WATER 12 FEET ON WATER STORAGE RESERVOIR IN NEW JERSEY

To cut construction costs on waterworks projects, predrain wet excavation with a MORETRENCH WELLPOINT SYSTEM. Guaranteed to produce dry results, installed and operated at low cost, MORETRENCH EQUIPMENT leads the field in satisfactory pumping performance.

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New Construction in April

CIVIL ENGINEERING construction volume in continental United States totals $140,379,000 for the four weeks of April, an average $35,095,000 per week for the month. The April weekly average is 4 percent below the average for the five weeks of March 1945, and 3 percent under the average for the four weeks of April 1944 as reported to *Engineering News-Record*.

Private construction, on the weekly average basis, tops the preceding month by 5 percent and climbs 60 percent above the corresponding 1944 month's volume. The private gain however, is offset by the decrease in public construction. Public work is 7 percent under a month ago and 18 percent below a year ago and is responsible for the decline in the overall total. Federal volume declines 19 and 24 percent, respectively, from last month and last year.

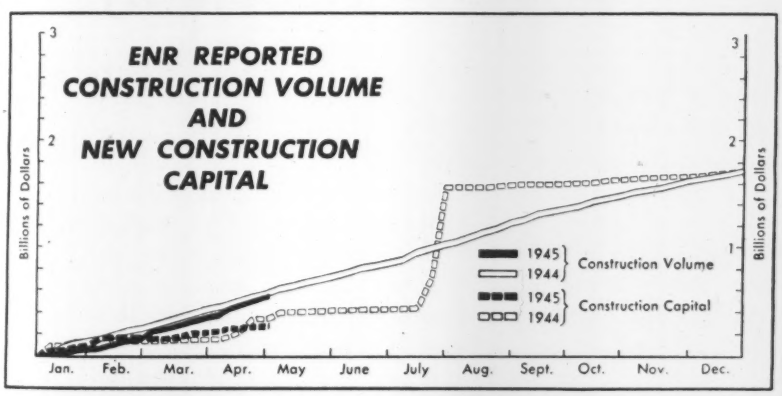
The April volume brings 1945 construction to $520,586,000 for the four months of the year, a total 12 percent below the $595,162,000 reported for the corresponding period last year. Private work, $157,643,000, is up 25 percent compared with a year ago, but public construction, $362,943,000, is down 23 percent. Federal volume, $301,931,000, is 27 percent lower than in 1944 and is responsible for lower public total, as state and municipal construction, $61,012,000, is 15 percent greater than in the period a year ago.

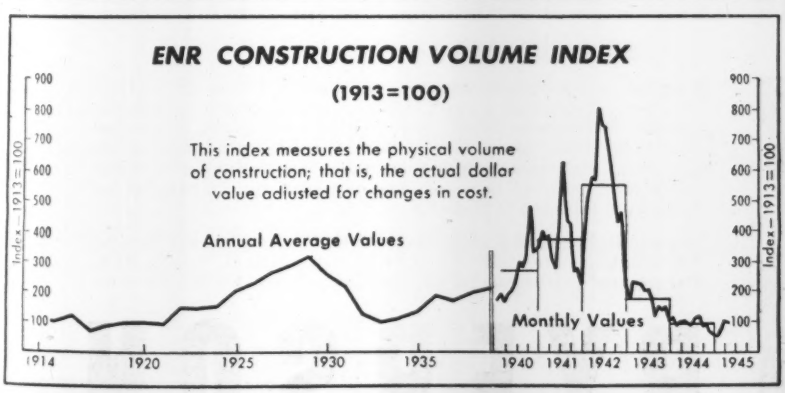
New Capital

New capital for construction purposes for April totals $29,158,000, a total 84 percent below that reported for the corresponding 1944 month. The current month's total is made up of $11,901,000 in state and municipal bond sales, $10,157,000 in corporate security issues, and $7,100,000 in RFC loans for industrial expansion.

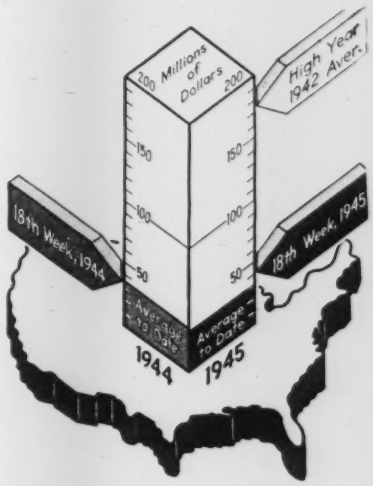
The April new financing total brings 1945 volume to $278,693,000 for the four months, a figure 24 percent below the $365,635,000 reported for the 1944 period. Of the 1945 volume, $180,656,000 is in private investment, $20,900,000 is in RFC loans for industrial expansion, and $77,137,000 is in federal appropriations for war and departmental construction.

(*See Volume Table, page* 85)




ENR CONSTRUCTION VOLUME INDEX
(1913=100)
This index measures the physical volume of construction; that is, the actual dollar value adjusted for changes in cost.
Annual Average Values
Monthly Values
Index—1913=100
1914 1920 1925 1930 1935 1940 1941 1942 1943 1944 1945

CONSTRUCTION ACTIVITY



As Reported This Week to...
Engineering News-Record

CONTRACT VOLUME

Continental U. S. Only
(Thousands of Dollars)

	Week of May 3 1945	Cumulative 1945 (18 wk.)	Cumulative 1944 (18 wk.)
Federal	$19,353	$321,284	$439,569
State & Municipal	8,185	69,197	57,948
Total Public	$27,538	$390,481	$497,517
Total Private	13,038	170,681	139,501
U. S. Total	**$40,576**	**$561,162**	**$637,018**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Type of Work	Dollar Volume (Thousands) This Week	Cumulative 1945 (18 wk.)	Cumulative 1944 (18 wk.)
Waterworks	$838	$12,568	$8,341
Sewerage	317	10,433	8,113
Bridges	364	8,302	3,805
Highways	5,965	46,621	48,977
Earthwork, Waterways	877	12,519	20,677
Buildings, Public	16,104	229,790	266,343
Industrial	8,069	120,912	58,641
Commercial	3,177	29,532	68,098
Unclassified	4,865	90,485	154,023

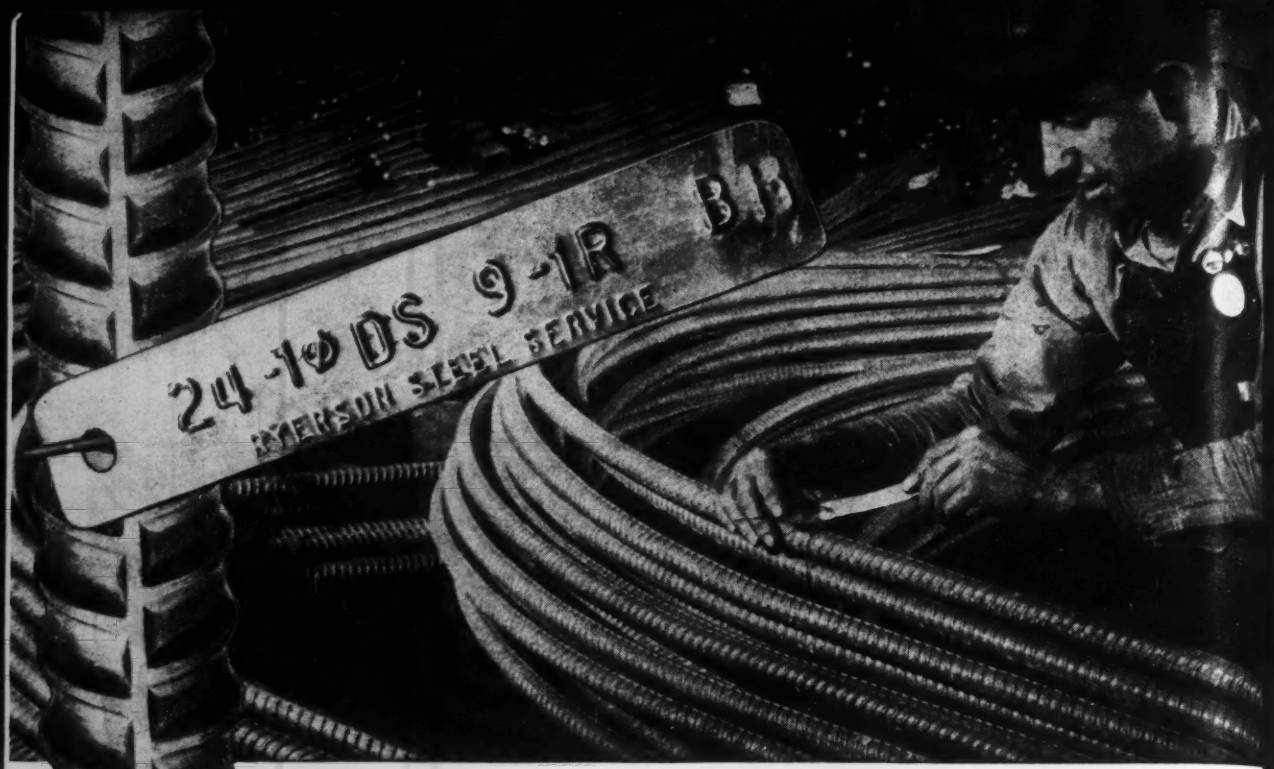
NOTE: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1945 (18 wk.)	Cumulative 1944 (18 wk.)
NON-FEDERAL	$212,793	$160,332
Corporate Securities	49,259	69,919
State and Municipal	142,544	36,633
RFC Loans	20,900	53,780
FEDERAL	$ 77,137	$245,266
Total Capital	**$289,840**	**$405,598**

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	May '45	307.43	147.78
Building Cost	May '45	238.46	128.90
Volume	Apr. '45	99	43



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Ryerson—your dependable source. Specify Inland Hi-BOND bars—cut, bent, and tagged. Other Ryerson products include: spirals, welded wire fabric, removable metal forms, fabricated structural steel, plates, sheets, bars, threaded products, tubes, etc.; road materials such as road mats, longitudinal and transverse joints, dowel bars, expansion joints, etc. Write for informative Hi-BOND Bulletin.

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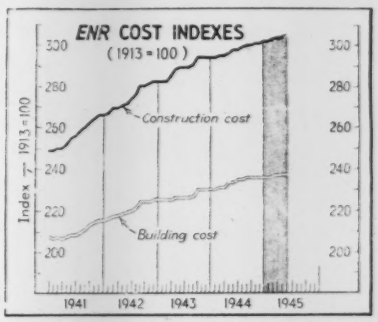
RYERSON

MAY CONSTRUCTION BUSINESS REPORT

ENR CONSTRUCTION VOLUME AND NEW PRODUCTIVE CAPITAL

(,000 omitted)	April 1944 (4 wk.)	April 1945 (4 wk.)	% Change	Four Months 1944 (17 wk.)	Four Months 1945 (17 wk.)	% Change
Total U. S. Construction	$145,040	$140,379	−3.0	$595,162	$520,586	−12.0
Private Construction	27,649	44,199	+60.0	125,989	157,643	+25.0
Public Construction	117,391	96,180	−18.0	469,173	362,943	−23.0
Federal	97,753	74,608	−24.0	415,900	301,931	−27.0
Total New Productive Capital	$183,997	$29,158	−84.0	$365,635	$278,693	−24.0
Private Investment	22,757	22,058	−3.0	106,023	180,656	+70.0
Federal (non-federal work)	46,240	7,100	−85.0	53,780	20,900	−61.0
Federal (federal work)	115,000	.....	.....	205,832	77,137	−63.0
ENR Construction Volume Index, 1913 = 10	106	99	−7.0	102*	86*	−16.0

** Four-month average.*



CONSTRUCTION COSTS . . . . WAGE RATES . . . . MATERIAL PRICES

	May 1944	May 1945	% Change	Change April to May 1944: April	1944: May	1944: %	1945: April	1945: May	1945: %
ENR Construction Cost Index, 1913 = 100‡	298.00	307.43	+3.2	297.70	298.00	+0.1	306.43	307.43	+0.3
ENR Building Cost Index, 1913 = 100‡	234.80	238.46	+1.6	234.50	234.80	+0.1	238.46	238.46	0

‡ Does not reflect increased costs due to overtime, lower labor efficiency, delivery delays, etc.

ENR 20-CITIES' AVERAGE

Common Labor	$0.874	$0.909	+4.0	$0.874	$0.874	0	$0.904	$0.909	+0.6
Skilled Labor (Av. 3 trades)	1.632	1.650	+1.1	1.632	1.632	0	1.650	1.650	0
Bricklayers	1.726	1.747	+1.2	1.726	1.726	0	1.747	1.747	0
Structural Ironworkers	1.688	1.705	+1.0	1.688	1.688	0	1.704	1.705	+0.1
Carpenters	1.481	1.498	+1.1	1.481	1.481	0	1.498	1.498	0
Cement, per bbl.	$2.64	$2.74	+3.8	$2.62	$2.64	+0.8	$2.74	$2.74	0
Reinforcing steel, cwt.	2.79	2.79	0	2.79	2.79	0	2.79	2.79	0
Structural steel, base	2.10	2.10	0	2.10	2.10	0	2.10	2.10	0
Sand, per ton	1.23	1.24	+0.8	1.23	1.23	0	1.25	1.24	−0.8
Lumber, 2x4, Fir, per M ft.	54.07	55.57	+2.8	53.99	54.07	+0.1	55.57	55.57	0
Lumber, 2x4 Pine, per M ft.	52.68	53.44	+1.4	52.20	52.68	+0.9	53.44	53.44	0
Common brick, per M	16.45	18.48	+12.3	16.20	16.45	+1.5	18.29	18.48	+1.0
Ready-mixed concrete, c. y.	7.39	7.57	+2.4	7.39	7.39	0	7.57	7.57	0
Struct. clay tile, 3x12x12	79.64	84.75	+6.4	79.34	79.64	+0.4	84.67	84.75	+0.1
Paving asphalt, cars, ton	15.25	15.48	+1.5	15.25	15.25	0	15.48	15.48	0

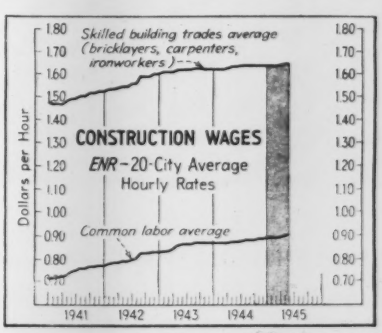
ENR INDEX NUMBERS

Base = 100	Construction Cost 1913	Construction Cost 1926	Building Cost 1913	Building Cost 1926	Volume '13	Volume '26
May, 1945	307.43	147.78	238.46	128.90	.....	.....
Apr., 1945	306.43	147.30	238.46	128.90	99	43
Mar., 1945	304.50	146.37	237.85	128.57	103	45
Feb., 1945	303.70	145.99	237.71	128.50	78	34
Jan., 1945	302.50	145.41	236.51	127.85	63	28
Dec., 1944	302.30	145.32	236.51	127.85	66	29
Nov., 1944	301.09	144.73	236.10	127.63	74	33
Oct., 1944	301.06	144.72	236.00	127.57	91	40
Sept., 1944	300.46	144.43	236.00	127.57	85	37
Aug., 1944	300.42	144.41	236.09	127.62	121	53
July, 1944	299.94	144.18	235.55	127.33	114	50
June, 1944	298.72	143.59	235.33	127.21	91	40
May, 1944	298.00	143.25	234.80	126.93	100	44
Apr., 1941	297.70	143.10	234.50	126.76	106	46
1944 (Av.)	298.64	143.59	234.73	126.89	96	42
1943 (Av.)	289.95	139.38	228.75	123.66	176	77
1942 (Av.)	276.31	132.82	222.39	120.22	553	243
1941 (Av.)	257.84	123.95	211.46	114.32	375	164

MATERIAL SHIPMENTS . . . . BUILDING PERMITS

	April 1944	April 1945	% Change	Mar. 1945	% Change Mar.-Apr.
Steel (% of operating capacity) A.I.S.I.	99.4	94.1	−5.3	96.0	−2.0

	March 1944	March 1945	% Change	Three Months 1944	Three Months 1945	% Change
Fabricated Structural Steel, tons A.I.S.C.	41,351	51,288	+24.0	119,452	144,449	+21.0
Cement, thous. bbl., U. S. B. of M.	6,225	6,988	+12.2	16,327	16,435	+0.7
Building Permits, 215 cities, Dun & Bradstreet (,000 omitted)	$75,827	$66,618	−12.1	$150,010	$184,984	+23.3



COST OF LIVING INDEX . . . . . NON-AGRICULTURAL EMPLOYMENT

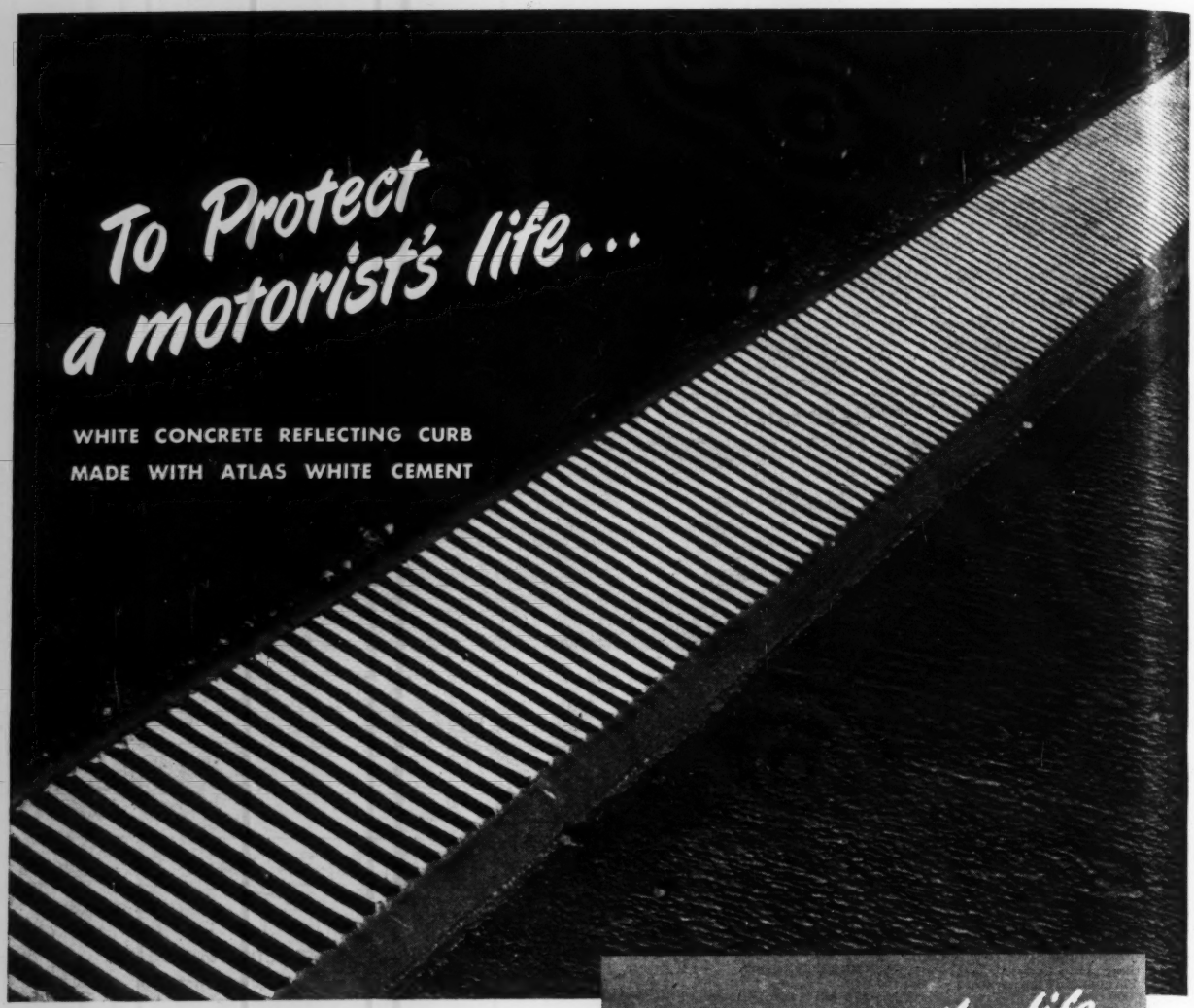
	March 1944	March 1945	% Change	Feb. 1945	% Change Feb.-Mar.
Cost of Living Index, N.I.C.B.	103.5	105.4	+1.8	105.5	−0.1
Rent (Housing) Index, N.I.C.B.	91.0	91.0	0	90.8	+0.2
Total Employment (est.) thous., B.L.S.	38,725	37,998	−1.9	37,936	+0.2
Constr. Employment (est.) thous., B.L.S.	678	598	−11.8	564	+6.0

ENGINEERING CONSTRUCTION CONTRACTS — ENGINEERING NEWS-RECORD — APRIL, 1945

Engineering News-Record *reports continental U. S. Construction projects of the following minimum costs — waterworks, excavation, drainage and irrigation,* $15,000; *other public works,* $25,000; *industrial buildings,* $40,000; *other buildings,* $150,000

Four weeks — Thousands of Dollars (000 Omitted)

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States April 1945	United States Four Months 1945	United States Four Months 1944	Canada
Public Works										
Waterworks	161	133	440	971	415	342	2,462	11,730	8,054	122
Sewerage	83	509	457	271	357	236	1,893	10,116	7,860	118
Bridges, public	30	85	114	.....	46	.....	275	5,403	2,729	.....
Earthwork and waterways	.....	222	72	244	693	1,903	3,134	11,642	19,995	273
Streets and roads	742	503	10,295	2,564	3,856	1,080	19,081	40,656	44,985	1,039
Buildings, public	2,600	5,235	5,497	6,709	11,716	14,533	46,290	213,686	252,784	5,588
Unclassified, public	452	5,474	4,422	1,971	1,678	9,048	23,045	69,710	132,766	232
Total public	4,068	12,161	21,278	12,730	18,801	27,142	96,180	362,943	469,173	7,372
Federal government (included in above classifications)	2,995	11,215	10,579	9,947	13,969	25,903	74,608	301,931	415,900	.....
Private										
Bridges, private	.....	35	.....	.....	.....	.....	35	2,535	870	.....
Industrial buildings	1,505	5,132	2,475	18,538	1,612	2,154	31,416	112,843	46,829	3,275
Commercial buildings	150	.....	549	200	1,066	3,050	5,015	26,355	67,164	3,928
Unclassified, private	27	105	2,219	.....	747	4,635	7,733	15,910	11,126	162
Total private	1,682	5,272	5,243	18,738	3,425	9,839	44,199	157,643	125,989	7,365
Total Engineering Construction:										
April, 1945 — 4 weeks	5,750	17,433	26,521	31,468	22,226	36,981	140,379	.....	.....	14,737
March, 1945 — 5 weeks	8,115	25,533	34,404	17,066	61,882	35,498	182,498	.....	.....	12,542
April, 1944 — 4 weeks	4,656	21,689	27,431	24,957	19,070	47,237	145,040	.....	.....	6,720
Four Months — 1945	17,930	72,659	99,447	72,332	132,038	126,180	.....	520,586	.....	34,985
Four Months — 1944	17,053	88,508	99,325	74,048	91,538	224,690	.....	.....	595,162	23,862



ON ANY ROAD, any highway... this scientifically improved curb provides greater visibility and maximum protection for motorists. The saw-tooth faces of reflecting curb catch the light from head-lamps and reflect it back to the driver. Thus, the curb makes itself visible—creating a continuous ribbon of reflected light which guides the driver safely and comfortably along the road. For complete details, write to our Atlas White Bureau.

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(United States Steel Corporation Subsidiary)
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ENR-CD-9

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The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • MAY 3, 1945 • VOLUME 134 • NUMBER 18

Construction control eased to aid reconversion

WPB Order L-41 changed to give AA-3 priority for reconversion preparation—Action seen as first step in removal of all construction restrictions

Early this week the War Production Board announced that order L-41, the general control of construction, had been modified to permit an immediate start of the industrial plant construction necessary to permit the American manufacturing industry to shift from war production to peacetime work wherever that could be done without interfering with the war.

Projects considered as coming under this classification will be given an AA-3 priority for the procurement of necessary materials and machinery. Since this rating is the highest priority given to war construction, except for a limited amount of work, the start of numerous industrial plant enlargements and alterations in the next few months is seen possible.

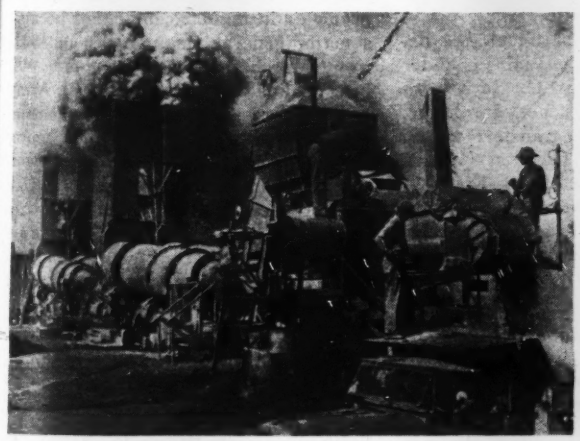
This modification of WPB controls was made by the issuance of Directive 5 to order L-41, which specifies that request to go ahead with construction be made as regular WPB-617 applications for priority. Work not expected to substantially interfere with the war effort and satisfying five general criteria will be approved and given the AA-3 preference rating.

These five criteria are: (1) The construction is necessary before production of civilian materials can be started, and postponement of the work would result in unduly delaying production when restrictions are completely removed; (2) the project calls for a relatively minor addition or alteration of the applicant's plant; (3) the construction is no more than what is needed for production at the minimum economical rate; (4) the work is not planned to replace or improve existing facilities that are adequate, though less efficient; and (5) the product to be manufactured is needed for civilian economy.

If an application is approved, the applicant will be assigned a controlled-materials-plan allotment symbol and an AA-3 preference rating which is the treatment usually accorded to approved contsruction. This rating is expected to obtain most types of building supplies, although lumber may continue to be extremely short of supply for some months (*ENR* April 26, vol. p. 595).

The new order is termed a reconversion preparation rather than reconversion itself, but the change is significant in that it is looked upons as the first major step in the removal of all construction limitations. The order was issued at this time to permit industry to prepare for maximum employment

John L. Haynes, director of the WPB Construction Bureau, reports that the new directive will permit little or no increase in many types of construction, including highway work, airport construction, water supply improvements, and other municipal work. Nevertheless, he believes that it illustrates a method of permitting much needed civilian construction to be started, rather than waiting until controls can be removed for all types of work. Director Haynes explains that the complete removal of restrictions will be done as soon as possible, but he sees no major changes for at least the first couple of months after V-E Day.



U. S. Navy photos from Barber Greene Co.

Seabee-operated American equipment on Guam airfield

Asphalt paving for landing strips on the Marianas Islands was turned out at rates up to 160 tons per hour from this plant. Material from two dual-drum dryers in tandem was hoisted to the mixer by a bucket loader and placed on the runways by a mechanical finisher. Seabees operate both plant and finisher to lay permanent surface on the runways.

More than $100,000,000 for Interior Department

Last week the House passed and sent to the Senate a bill (H.R. 3024) providing an appropriation of $101,242,628 for the Department of Interior for 1946. The bill as reported out by the House contains considerable funds for construction and civil engineering developments by the Bureau of Reclamation and the Geological Survey.

A construction fund payable from the Federal Treasury includes items for the bureau totalling $16,200,000. This appropriation provides for the continuation of construction at several projects and will be spent as follows—Central Valley Project, $4,500,000; Boise Project, Anderson Ranch Dam, $3,000,000; Tucumcari Project, $1,400,000; Columbia Basin Project, $6,000,000; Lugert-Altus Project, $600,000; San Luis Valley Project, $400,000; and Yakima Project, Roza Division, $300,000. Also $1,440,000 is provided for preconstruction work on the Missouri River Basin Project.

Other money provided for the bureau includes a total of $6,758,500 from the Reclamation Fund which will be used as follows for construction and engineering development: $1,750,000 for construction of the Provo River Project; $800,000 for the Colorado-Big Thompson Project; $500,000 for the Gila Project; $450,000 for the Palisades Project; $450,000 for the Deschutes Project; $60,000 for the Sun River Project; $100,000 for the Hungry Horse Project; and $23,500 for the Willwood Division of the Shoshone Project. Also to be drawn from the Reclamation Fund is $125,000 for investigations, surveys and studies of proposed projects.

An appropriation for operation and maintenance of reclamation projects totals $829,800. A total of $6,852,260 is provided for the Geological Survey. This sum includes $2,046,560 for topographical surveys, $1,635,800 for stream gaging and water supply work, and $1,000,000 for geologic surveys.

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Only 8 grades of paving asphalt may be made

On April 27th the Petroleum Administration for War issued Directive No. 80 directing refiners to manufacture only eight specified grades of paving asphalt, nine grades of "cutback" asphalt, and five grades of slow-curing road oil. The directive became effective May 1.

By limiting the number of grades of asphalt that are used it will be possible to increase the efficiency of tank car operations, it was explained.

Personnel changes in N. Y. Board Water Supply

Designation of Roger W. Armstrong, former deputy chief engineer, as chief engineer heads a list of general changes in the New York Board of Water Supply, the organization responsible for construction and maintenance of engineering works for collecting and delivering water to New York City. John M. Fitzgerald, department engineer, is now deputy chief engineer.

R. W. Armstrong

In the watershed Department, Hiram A. Hill, who had been acting head of the department since the retirement of J. A. Guttridge in June, 1944, was appointed department engineer, his former position of senior division engineer being filled by the transfer of Victor C. Brownson, division engineer, from Neversink. To fill the resultant vacancy, Max F. Freund was transferred from the Rondout Division office at Kerhonkson to take charge of the Neversink work. John Horn then taking over Mr. Freund's duties at Kerhonkson as acting division engineer. The two remaining divisions of this department, Lackawack and Downsville, continue under the supervision of N. LeRoy Hammond and John C. Buhrendorf, respectively.

The work of the Hydrographic Section force of the Watershed Department, formerly directed by Sidney K. Clapp, who organized this force in 1907 and continued as its head until his retirement two months ago, is now supervised by Bernard J. Sullivan.

In the Eastern Department, the department office at White Plains is under the direction of Oscar C. Hays, with W. Courtland Thomas, next in charge. Mr. Hays was recently transferred from the Fishkill Division Office at Carmel, where he was succeeded by Frank J. Musso. Wayland Dickens and Isaac Smallen continue as heads of the Newburgh Section office and Kensico Division, respectively.

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Big deficiency bill signed by President

Late last week President Truman signed a $2.4 billion Deficiency Bill (H. R. 2374). The law provides considerable money for new construction, as outlined in the April 26 issue of *Engineering News-Record*, vol. p. 602.

Reybold and Clay become lieutenant generals

For the first time the Corps of Engineers is now headed by a three-star general, since Congress has confirmed the promotion of Lieut. Gen. Eugene Reybold. At the same time the promotion of Lieut. Gen. Lucius D. Clay to that title was confirmed.

General Reybold took his civil engineering degree at Delaware College in 1903 and in 1908 he was commissioned a second lieutenant in the Coast Artillery Corps.

General Reybold transferred to the Corps of Engineers in 1926 (see *ENR* Aug. 5, 1943, vol. p. 231) and was assigned as Acting Chief in September, 1941, after a thirteen months' tour of duty as Assistant Chief of Staff, G-4, (Supply Division), a training that he was to find invaluable in the hectic months that followed. On October 1, 1941, he became Chief of Engineers.

Some idea of the task confronting General Reybold can be gathered from the fact that, to date, the construction division, office of the Chief of Engineers, has handled a program of $11,500,000,000, of which work amounting to $11,143,000,000 is in place. The supply division has spent approximately $6,500,000,000 since Pearl Harbor.

General Clay was recently appointed to the staff of General Dwight D. Eisenhower to serve as his deputy in charge of civil affairs in Germany when General Eisenhower assumes supreme command there under the arrangement agreed upon for the occupation of Germany. He was born in Marietta, Ga., in 1897. Following graduation from the U. S. Military Academy, West Point, he was appointed a second lieutenant, Corps of Engineers, in 1918. He was promoted in regular course and became a major general (temporary) in 1942. From March, 1942 to December, 1944, he served as Director of Materiel, Army Service Forces, in which assignment he correlated and supervised the procurement and production activities connected with the Army supply program and prepared and maintained the requirement programs under international aid. He served as assistant to the Director of War Mobilization until April, 1945.

Arthur C. Butler has been appointed director of the National Highway Users Conference, according to Alfred P. Sloan, Jr., chairman. Mr. Butler will assume his new duties early in June. He has been serving as acting director of the conference since the resignation last fall of Chester H. Gray.

Construction machines at the war fronts highly praised by Navy leaders

America's heavy construction equipment has bested the Japs' machines as decisively as our ships have outfought the Jap Navy

The part played by American-built bulldozers, trucks, carryalls, power shovels, and other equipment in enabling the Seabees and Marine and Army engineers to outbuild the Japs many times over has until recently received little public recognition. However the giant construction program needed to prepare a ring of bases for the final assault on Japan has focused attention on America's clear-cut superiority in construction equipment.

Full recognition of this superiority came recently from both Secretary of the Navy James Forrestal and Fleet Admiral Chester W. Nimitz in press conferences held in Washington. Secretary Forrestal talked to the newspapermen following his inspection tour of Pacific bases including Iwo Jima.

"I would like to stress the fact," he said, "that modern war, and particularly this war in the Pacific, is a war of machines—not merely of the machines of war but the machines of building. That is one of the places where we have a tremendous edge on the Japanese.

Japs lack equipment

"The Japs do not have our kind of heavy machinery. I am talking of bulldozers, trucks and tractors—all of the big, rugged machinery which this country has been particularly successful in developing.

"Unless you have been out to the Pacific, you can't visualize the tremendous edge this kind of equipment gives us in terms of both speed and skill. You can do things that are just beyond any possibility for the Japanese."

Three days later Fleet Admiral Nimitz added the weight of his opinion in these words: "We have many advantages (in our prosecution of the war against Japan.) First of all, we have a heavy industry in the United States. It has made possible in a very short time the consolidation of the positions that we have taken so that we can use them as bases. I think that is very important. You see dredges, earth moving machinery and road building equipment of tremendous size being operated by Seabees and Army Engineers all through the islands and moving along at a pace greater than we ever anticipated."

Supporting these observations are reports from Navy Civil Engineer Corps officers who direct the Seabees in their base building jobs. Without exception they are contemptuous of the little, light construction equipment the Japs have been using in the building of air bases.

"Speed," said Commander Joseph P. Blundon, CEC, USNR, "is the essence of modern warfare, and I speak conservatively when I say that our Seabees can build more in a week than the Japs can in a month. Furthermore, our men can build airfields on difficult terrain, whereas the Japs, using slow hand labor, are limited to easily converted sites."

Even with what little equipment they have, the Japs are at a great disadvantage with their light machines as compared to Americans using far heavier equipment, these officers point out. The heavier equipment has four vitally important advantages: (1) it can do bigger and faster jobs, (2) it withstands wear and tear better, (3) it can operate continuously for much longer periods, and (4) it has sufficient power to enable it to operate under conditions of terrain that would completely bog down lighter equipment.

That the Japs do not have the equipment necessary to maintain their air bases properly is evident in the conditions of chaos that existed at Clark Airfields in the Philippines.

Of the dozen or so strips comprising the Clark fields near Manila, only one was surfaced when recaptured by American troops. Of the unsurfaced fields, only one appeared in condition to operate combat planes. The remainder were in poor shape and gave evidence of hasty and inadequate maintenance.

The only construction equipment found consisted of one American carryall, one American tractor (both presumably abandoned in 1942), two coal burning steamrollers, and one crude concrete-filled roller. Native labor declared that very little power equipment was available and that most of the work was of the wheelbarrow variety. Generally, only major imperfections in the strips had been levelled, and taxiways were usually so rough that jeeps could proceed only in second gear.

The same kind of conditions were found when the Seabees first moved into the Admiralties. The light construction equipment found in use at the Momote airstrip was so inadequate for the job that the Jap's airfield was hardly more than an undulating, sandy plot cleared from a coconut grove. Its surface was poorly compacted and far too thin to support the weight of American planes. The result was the Seabees had to rebuild the strip completely.

One to ten superiority

Not only in airfields, but in the building of roads has American heavy equipment proved its overwhelming superiority. An outstanding example is at Guam. Thanks to bulldozers, heavy trucks, diesel shovels, drag lines, seventon rooters, and heavy graders, the Seabees were able to build a hundred-mile network of roads, with a four-lane express highway as its hub—all in the first 90 days after the invasion. In the preceding 32 months, the Japs had been limited to building a few winding, narrow, unimproved roads that were all but washed away each rainy season.

Best Jap equipment is road rollers, two of which are shown being towed on a captured air strip by a small U. S. tractor.

An advisory committee for public works formed

Formation of a public works construction advisory committee, composed of representatives of eleven national organizations engaged in or responsible for the planning, design, construction or operation of public works, was announced last week by Maj. Gen. Philip B. Fleming, Federal Works Administrator.

General Fleming has designated Col. William N. Carey, Chief Engineer, FWA, to act as contact between the committee and the administrator.

Committee members and the organizations represented are:

Frederic Bass, American Public Works Association; E. Lawrence Chandler, American Society of Civil Engineers; F. Stuart Fitzpatrick, United States Chamber of Commerce; J. W. Follin, Producers' Council, Inc.; H. E. Foreman, Associated General Contractors of America, Inc.; Hal H. Hale, American Association of State Highway Officials; S. Logan Kerr, American Society of Mechanical Engineers; Earl Mallery, American Municipal Association; Major Edmund R. Purves, American Institute of Architects; R. J. Gray, vice president of building and construction trades department, Washington, D. C., American Federation of Labor, and Col. Paul Betters, executive director of U. S. Conference of Mayors, representing his organization. A representative of the Council of State Governments also will be named.

Mr. Chandler has been chosen to act as chairman and Mr. Fitzpatrick will serve as secretary of the committee.

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Surplus Property Office shifted to Commerce

The Office of Surplus Property of the Treasury's Procurement Division last week was transferred to the Department of Commerce of which Henry Wallace is secretary. The transfer was recommended by the Surplus Property Board, Secretary of the Treasury Henry Morgenthau, Jr., Secretary Wallace, and War Mobilization Director Fred M. Vinson to relieve the Treasury Department of an activity not directly related to its field of responsibility.

No major changes of personnel are expected. Edward Phillips is expected to continue as director of the machinery section of Office of Surplus Property. It is this section which has been holding the sales of construction equipment during recent weeks (see *ENR* March 22, 1945, vol. p. 393, for a detailed description of a sale).

MEN AND JOBS

Col. Richard W. Pearson, deputy engineer of the 12th Army Group, recently received the Bronze Star and the French Croix de Guerre for his role in the liberation of France. The Bronze Star citation, after crediting him with "superior technical knowledge," continues:

"He supervised, and in many instances personally studied and advised, on methods of overcoming beach obstacles in connection with the assault on the continent. Under his supervision, the problem of assignment of engineer troops to effect a proper balance of strength between assault and build-up was successfully solved."

Col. Lester F. Rhodes, a graduate of West Point and of the Massachusetts Institute of Technology, recently returned from overseas duty, has been named successor to **Col. Robert C. Hunter** as Sacramento, Calif., district engineer, U. S. Army Corps of Engineers. Col. Hunter served as district engineer at Sacramento from 1940 until his assignment to overseas duty in 1944. Since his departure the acting district engineer has been **H. M. Rich.**

Roy Butler has been employed by the city of Beaver Dam, Wis., as consulting engineer and acting building inspector.

W. H. Moore, for several years Division 4 engineer for the Ohio State Department of Highways, has become associated with the United Products Co., Akron, as consulting engineer on highway maintenance materials.

A. C. Hahn, city engineer of Fallon, Nev., for the last 11 years, resigned recently to enter private business.

Charles D. Davis of Seattle has been named chief safety engineer for the Washington Department of Highways by Director Clarence Hickey. Mr. Davis was supervisor of safety on construction of Grand Coulee and Bonneville dams on the Columbia River, and also for the tunnel leading to the Lake Washington concrete pontoon bridge at Seattle. In 1942 he was chief safety engineer for Army and Navy construction in the Aleutians.

D. Westall has been appointed engineer for the Arkansas State Highway Department, District No. 7, with headquarters at Camden, Ark., succeeding J. H. Harman.

Charles Bonefield, Cincinnati, has been named Division 8 engineer for the Ohio State Department of Highways, with headquarters in Middletown. The division comprises Hamilton, Montgomery, Preble, Greene, Butler, Warren, Clinton, and Clermont counties.

Worden Holsdo, who was serving Elkhorn, Wis. as superintendent of the light and water commission, has been appointed superintendent of public works.

G. A. Draper, research engineer, has resumed his association with Mississippi State Highway Department, after serving with the U. S. Army Engineer Corps in Puerto Rico. He was released recently after having attained the rank of lieutenant colonel.

Lester W. Bray of Durham, N. C., who received a commission in the Army Corps of Engineers in 1942, has been promoted to captain from first lieutenant at the Army Air Forces Overseas Replacement Depot at Greensboro, N. C., where he is an engineering officer.

Col. Joseph E. Vollmar, who recently returned to St. Louis, Mo., after 2½ years in the European Theater of Operations, has resumed his former position as president of the Fruin-Colnon Contracting Co., and its affiliate, the Fruco Construction Co. Col. Vollmar, as an engineering officer in the Aviation Engineers, U. S. Army, was responsible for much construction of airdromes, hospitals, supply depots, etc., overseas. He has been awarded the Legion of Merit.

James B. Rankin, hydraulic and railway engineer for the Colorado Public Utilities Commission, retired recently after 20 years of service. A native of West Virginia, Mr. Rankin attended West Point and was graduated from the University of West Virginia.

(*Continued on page* 176)

Public Housing Authority designated to dispose of surplus housing

Policies of National Housing Agency govern disposition of dwellings that become surplus during or after the war

The National Housing Agency has been designated by the Surplus Property Board as disposal agency to handle the sale of surplus housing property and facilities and has assigned disposal responsibility to its constituent unit, the Federal Public Housing Authority. The disposition plans, based on policies adopted by the National Housing Agency, will affect the bulk of more than 200,000 publicly financed permanent family dwellings, including demountables, which will become surplus either during or after the war. They also cover the disposal of most of the temporary housing declared surplus during the war.

In accordance with the Lanham Act, permanent war housing that is not demountable and that becomes surplus to war needs will be sold for private residential purposes unless transferred for use by other federal agencies or other uses specifically authorized by Congress. Projects may be considered for use as low-rent housing where local communities, through their governing bodies and the local housing authorities, request it. The Lanham Act provides that such housing may not be used for low-rent projects except with specific approval of Congress. In cases of such local requests, other disposition plans will be deferred to give Congress an opportunity to consider the requests.

Preference list established

In the disposal of such dwellings to purchasers, present or prospective occupants are to be given preference. The following order of preference has been set up: present occupants, war veterans desiring homes for their own use, other prospective occupants, private investors.

The Lanham Act requires that in disposing of permanent housing consideration shall be given to its full market value. Selling prices on dwellings are to conform so far as possible to values established by competent appraisal.

Federally-owned homes built with U. S. Housing Act funds will be sold to local housing authorities to provide housing for war workers as long as there is a war need and afterward for low-rent use as provided in that act. Sales prices will be established by FPHA on the basis of their long-term value as low-rent housing. Projects sold to local housing authorities will be eligible for loan and subsidy assistance as provided for other low-rent housing built under the United States Housing Act. Pending sale, the FPHA may lease the projects to local housing authorities.

Of the 420,000 temporary housing accommodations, including portable shelter units other than house trailers, any that become surplus during the war will, if possible, be transferred to other Federal agencies for their use in this country or for emergency housing abroad by United Nations governments.

G. Richard Davis merges with Hegeman-Harris Co.

Hegeman-Harris Co. Inc., one of the outstanding firms in the building industry, has announced that the long established builder G. Richard Davis & Co., Inc., has joined Hegeman-Harris. After May 1 the Davis firm will have its offices jointly with the Hegeman-Harris Co. at 331 Madison Ave., New York City.

At present the Hegeman-Harris Co. is carrying out several large contracts in South America. It has built many of the finest buildings in the large cities of the United States and has also executed a number of building contracts in London and Paris.

JOBS OF THE WEEK

TUNGSTEN ORE REDUCING PLANT, Moundsville, W. Va.

George A. Fuller Corp., New York, N. Y., has been awarded a contract to construct a tungsten ore reducing plant on 72-acre site at Natrium, at an estimated cost of $6,000,000 with equipment. Smith-Hinchman & Grylls, Inc., Detroit, Mich. is the engineer.

PLANT, West Haven, Conn.

Gilbane Bldg. Co., Providence, R. I., has been awarded a contract to construct a reinforced concrete plant on Elm St., for Armstrong Rubber Co., West Haven, Conn. The estimated cost is $2,000,000. Defense Plant Corp. will finance. Fletcher Thompson, Inc., Bridgeport, Conn. is the engineer.

HOSPITAL, Halifax, N. S.

E. G. M. Cape & Co., Montreal, Que., has been awarded a contract to build Ross Miller Memorial Hospital and power house building at New Camp Hill Hospital, by the Department of Public Works, Ottawa, Ont. The estimated cost is $2,000,000.

AIRPORT IMPROVEMENTS, Mills Field, Calif.

Macco Construction Co. and Morrison-Knudsen, Co., San Francisco, Calif., at $939,365 were the lowest bidders for paving, drainage and lighting at Mills Field, when U. S. Engineers, San Francisco, Calif., opened bids.

RAILROAD, Florida

Florida East Coast Railway Co., L. C. Frohman, chief engineer, St. Augustine, will build by its own forces 30 miles of railroad from Okeechobee City to Fort Pierce to join Miami Line. The estimated cost is $1,500,000.

HOUSING, Charlestown, Ind.

Public Housing Authority, Chicago, Ill., awarded a contract to construct 600 portable family dwellings to National Homes, Inc., Lafayette, Ind. at $980,000.

BARRACKS, Portland, Ore.

U. S. Engineers, Portland, Ore., awarded a contract for the construction of 1,500 plywood insulated barracks to Timber Structures, Inc., Portland, Ore. The estimated cost is $1,050,000.

HOSPITAL, Houston, Tex.

James Stewart Corp., Houston, Tex., will construct auxiliary buildings and utilities at the Naval Hospital here to cost $3,347,304. Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded the contract.

TOBACCO PROCESSING PLANT, Aylmer, Ont.

Pigott Construction Co., Ltd., Hamilton, Ont., will build a tobacco processing plant for the Imperial Tobacco Co., Ltd., Montreal, Que., to cost about $1,500,000.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 233.

Lower Mississippi River levees now carrying near-record flood

Flow of 2,130,000 cfs. held in main river and subsidiary channels without use of the morganza Floodway

Levees in the lower Mississippi valley are holding against a combined discharged of 2,130,000 cfs. in the main river and the Atchafalaya, the greatest flood ever to be confined within the embankments. The 1927 flood was estimated to have discharged about 300,000 cfs. more water, but at that time the levee system was riddled with breaks. About 1,500,000 cfs. of the present flood is going down the Mississippi below Red River Landing, the remaining 630,000 cfs., which includes the Ouchita and Red outflows, is carried to the Gulf through the Atchaflalaya River valley. The prolonged flood has already soaked the levee embankments for more than a month, another new record in highwater history.

Design capacity exceeded

The Army Engineer project plan calls for a maximum of 1,500,000 cfs. to be carried down the main river below Red River Landing, with 250,000 cfs. drawn off through Bonnet Carre Spillway above New Orleans to protect that city, and only 500,000 cfs. to be discharged through the Atchafalaya at Simmesport. Levees along the latter river are designed for only that amount of flow. All excess is supposed to be carried through the Morganza Floodway, an uncontrolled cutoff between the Mississippi and the lower Atchafalaya. However, Brig. Gen. M. C. Tyler, president of the Mississippi River Commission, believes he can safely hold the flood in the two main channels, thus avoiding opening the Morganza floodway.

Arkansas and White run wild

Chief trouble in the middle Mississippi basin last week was on the White and Arkansas rivers in Arkansas. The White crested for the fourth time in two months, sprawling all over its valley through local district levees largely demolished by previous high-water attacks.

The Arkansas went on its third rampage, flooding the country from Ft. Smith down to Pine Bluff, where the federal project levees start. The latter flood reached 32.1 on the Pine Bluff gage, a foot and a half below the all-time record established in 1944. The St. Louis-Southwestern R. R. bridge at Rob Roy, below Pine Bluff, was almost lost when the river cut behind the south abutment and washed out 100 ft. of approach embankment, but fast work by Army Engineers and railroad forces closed the break before the abutment was undermined. Three emergency setback levees finally stopped a caving bank on the north shore of the Arkansas at Hannaberry Lake below Pine Bluff. Highways and railroads in both the White and Arkansas valleys were affected.

The Ouachita is dropping slowly at Monroe, La., after cresting at 50.4 ft., a new high record. A 2000-ft. mudbox down Grand St. sealed a gap in the river-front wall and kept the city dry.

Red River controlled

After surging through breaks in local levees between Shreveport and Alexandria, tearing out railroads and highways, and giving Pineville, opposite Alexandria, a bad scare, the Red River flood is now being held between federal project levees from Alexandria to the head of the Atchafalaya. In the lower stretch one 160-ft. truss span and a long concrete trestle approach were lost on the highway bridge at Moncla.

History shows that more floods may be expected in the middle Mississippi valley in May, but General Tyler hopes that the present high water will get out of the way in the lower valley before more water comes down.

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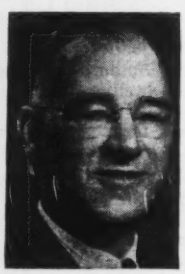
Goit succeeds Hurlbut in L. A. Water and Power

Promotion of Laurance E. Goit to chief engineer of water works and a deputy general manager of the Los Angeles, Calif., Department of Water and Power was voted April 24 by the city's Board of Water and Power commissioners. He succeeds W. W. Hurlbut, who retired Apr. 1.



L. E. Goit

Advancement of Mr. Goit to his new position from that of assistant chief engineer of water works was made on the recommendation of Samuel B. Morris, who recently succeeded H. A. Van Norman as general manager and chief engineer of the Department of Water and Power. He will serve at a salary of $18,000 a year.

Mr. Goit is a graduate of Lewis Institute of Chicago, Ill., and has been with the Los Angeles Department of Water and Power since 1924. He started as a draftsman and successively was chief draftsman, engineer of water distribution and assistant chief engineer of water works.

In retiring, Mr. Hurlbut ended a career with the department which began in 1907 when he was a draftsman for the Owens Valley Aqueduct.

W. W. Hurlbut

Mr. Hurlbut was president of the American Water Works Association in 1936-37 and in 1941 he received the association's John M. Diven Memorial Medal.

He studied at the Colorado School of Mines, University of California and Stanford University and began practice as a civil engineer in 1903. Before entering municipal service, he was assistant engineer for the Huntington Land and Improvement Co. and the Pacific Electric Corp.

Successive promotions led to granting of his dual title with the Water and Power Department in 1943 after he had for 15 years been in charge of construction, maintenance and operation of Los Angeles' water distribution system, the second largest in the country.

OBITUARY

Ralph Lyman Harding, 62, engineer and builder, died in Cleveland, Ohio, April 24. He was graduated from Case School of Applied Science in 1905. In 1906 he went to the Philippines where he was in charge of the construction of the railroad from Manila to Legaspi. He was also engineer in charge of designing and constructing wharves, warehouses, bridges and terminal facilities at the latter port. In World War I he was adjutant of the 32nd Engineers in charge of construction at the port of Bordeaux.

After the war Mr. Harding joined the Cleveland engineering and architectural firm of Wilbur Watson & Associates and eventually became senior partner.

The Week **In Engineering and Construction**
Continued on page 153

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Pioneer Illustrator

Sir: With the recent death of derick Percy Burt at the age of 84, but one of the half dozen men I nd working on *Engineering News* en I joined its staff in November, 7, have passed to the Western re. Gathered in one room in the Tribune Building opposite City l Park were George H. Frost, nder and publisher; D. McN. uffer and Arthur M. Wellington, tors-in-chief; assistant editors rles Whiting Baker and E. E. R. tman; and draftsman Burt.

First as draftsman then as business nager, Burt was with *Engineering* s nearly ten years. He then be- e editor and part owner of the erican *Architect.* During World I he commanded a ship in the S. Quarantine Service, New York rbor. For a few years he was on editorial staff of *Engineering and ntracting,* and after that editor of a rnal devoted to office-building man- ment, both published at Chicago. ring his last years he lived with a in Boise, Idaho; Spokane, Wash.; Buhl, Idaho.

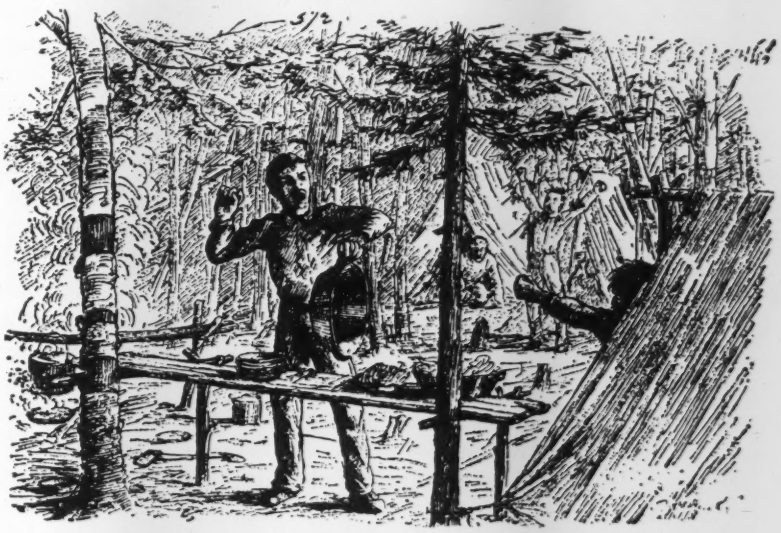
Burt was not only an able mechan- draftsman but also a skillful pen- ink artist—witness hundreds of tches with his signature in *Engi- ring News* from 1887 on into the 1900's, also the illustrations for his article on Canadian Government Surveys beginning in *Engineering News* of July 10, 1886, which led to his engagement as draftsman, one of which, entiled "Breakfast" is given below.

M. N. BAKER
Associate Editor (Retired), Engineering News-Record, Upper Montclair, N. J.

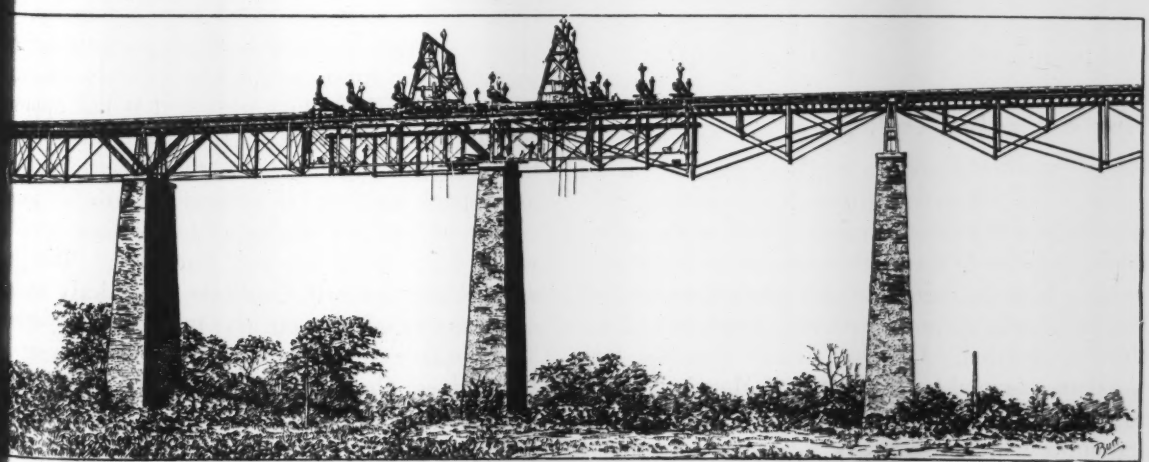
Frederick P. Burt made a very real contribution to engineering literature during the years that he was on the staff of *Engineering News* through his ability to put into pictorial form information that could not easily be conveyed in written words. Sixty years ago, photographs were expensive and difficult to make. Engineering journals and the technical societies had to depend almost entirely on text, line drawings and crude sketches for their records of engineering and construction operations.

Mr. Burt combined engineering knowledge with an unusual facility to draw. How well he used these talents is shown by his sketch of changing trusses on the Appomattox Bridge.

By the time Mr. Burt moved on to a more responsible position the camera had begun to come into more general use and photographs had started to displace sketches in the method of pictorial presentation that had been inaugurated by Mr. Burt's pioneering work.—THE EDITORS.



BREAKFAST!



THE APPOMATTOX HIGH BRIDGE—CHANGING TRUSSES.

EDITORIALS

VOLUME 134 NUMBER 18

May 3, 1945

Bridging the Rhine

UNLESS ONE PAUSES TO THINK about what was required to build a railroad bridge across the Rhine at Wesel in 10 days, as described elsewhere in this issue, the magnificance of the achievement is apt to be missed. Such thought will emphasize, for example, that the equivalent of 221.5 ft. of a substantial, modern bridge, or three piers and three spans, had to be completed every 24 hr.; that the materials, and particularly the erection equipment, had to be available in sufficient quantities that substantial losses would not affect the work; and that these supplies had to be moved up over roads and railroads where troops and ammunition had much higher priorities. Reflection upon the basic aspects of the job—prefabrication, simultaneous operations at many points, and the use of high-capacity construction equipment mounted on barges—will also establish proper appreciation for the designing and erection planning job involved, for the decisions made in fixing the sites (for there were several other Rhine bridges besides the one at Wesel that had to be ready to be started on D-Day), and for the selection of structural systems that would be safe yet speedily erected. When one has gone thus far, it is probable, too, that the Rhine operations will be seen to offer some lessons for peacetime bridgebuilding as well as to represent the acme of military bridging technique. And it will readily be admitted that they give Americans just one more reason, to add to many others, for being proud of the American engineer in uniform.

House Moving Today

HOUSE MOVING TODAY is big business both in this country and overseas—witness the transportation of demountable houses to France as well as the several recent projects of mass relocation in this country involving both demountable and conventionally built war housing to serve the ever changing needs of wartime production. One has but to view the large program planned by the National Housing Agency to dispose of some 800,000 publicly-financed dwelling units within two years following cessation of hostilities to realize that house moving will be even bigger business after the war. At that time s present importance of speedy relocation and co servation of building materials will give way economy of methods used in dismantling, transpo ing and re-erecting such dwellings. Although co ducted primarily as a hurry-up wartime house mo ing project, methods employed to dismantle, tra port and re-erect 109 non-demountable FPH houses, described elsewhere in this issue, point t way to more economical house moving as the ne for such movements increases.

Release of Sanitary Engineers

ANNOUNCEMENT OF A POLICY for the release sanitary engineers in the military service and t manner by which they will be made available f essential civilian duties (*ENR* April 26, vol. 604) is a further demonstration of the intellige direction that has been applied in the allocation sanitary engineering personnel. At the outbreak the war it became evident that there were hard enough sanitation specialists to meet increas civilian needs let alone provide additional numbe for military service. On the recommendation the Committee of Sanitary Engineering of the N tional Research Council a procurement and a signment service was established in the War Ma power Commission, and the task of allocation w placed in the hands of state advisors. The latte most of whom were the chief engineers of the st health departments, were intimately acquaint with local needs and resources, and they were giv the responsibility of declaring whether specific m should or should not be made available for milita duties. How well they discharged this responsib ity is revealed by the knowledge that military mands were satisfied and essential civilian sani tion services were prevented from collapsing. T record shows that almost half the sanitary engine in the nation were assigned to military duties.

Now the WMC announces that it has approv another plan advanced by the Committee of Sa tary Engineering to utilize the procurement a assignment services "in reverse" to provide for t return of sanitary engineers to civilian activiti which have been severely curtailed. This fo sighted program will facilitate the orderly trans of these specialists from war to peacetime pursu The sanitary engineers have reason to congratul themselves; their spokesmen on the National R search Council have furnished an example of telligent and aggressive leadership in the depl ment of professional manpower.

Beyond the Water Treaty

LOGIC AND COMMON SENSE prevailed when the Mexican water treaty came up for final action in the Senate. No one of the 30 reservations offered by opponents was adopted, and the 11 reservations proposed by the chairman of the Foreign Relations Committee in an effort to meet some of the objections to the wording of the treaty finally were converted into "understandings" which were written into the Senate's resolution authorizing the President to ratify the treaty. Seeing what the Senate did, one may surmise that the opponents of the treaty overplayed their hand. So many of their objections were far-fetched or were obviously strained interpretations of reasonably clear treaty provisions that most of the Senators must have concluded that the opponents had a weak case.

The treaty is a fair and equitable document which is badly needed as a means for minimizing if not entirely eliminating future difficulties with Mexico as use of the waters of the international rivers increases in the years to come. Opposition to it on the part of Southern Californians needs to be appraised in the light of the fact that *any treaty* that puts our relations with Mexico concerning Colorado River water on a proper basis would of necessity take from the Imperial Irrigation District potentially valuable rights that it had acquired or expected to acquire under its contract with the federal government relating to the All-American Canal. Under that contract the district could have developed power with water going to Mexico and even charged Mexicans for use of part of the canal.

One thing that can be said in favor of California's fight against the treaty is that it has served to draw attention to defects in existing agreements relating to Colorado River water. One of them is this contract under which facilities built as part of the All-American Canal project were to be handed over to the Imperial Irrigation District without adequate restrictions to protect our international obligations. Another is failure of the federal government to make any provision for reservoir and other losses when apportioning the water stored behind Boulder Dam among the states of the Lower Basin.

If a fight between our own states over Colorado River water as bitter and unreasoned as this recent attack on the water treaty is to be avoided, the water contracts with California, Arizona and Nevada need to be reconsidered in the light of current knowledge as to available water. Also, those three states should conclude the three-state compact relating to these waters that was anticipated in the Colorado River Compact. These are matters calling for early action, which ratification of the Mexican water treaty should facilitate.

Construction Under Truman

AS THE TRANSITION CONTINUES from the period of emotional shock brought on by President Roosevelt's untimely death to the reestablishment of governmental routine under a new regime, it is gratifying to note a growing feeling of confidence that all is going to be well. Entire credit for this happy state of affairs belongs to President Truman, for by his straightforward and unequivocal handling of difficult world problems and tricky political situations he already has demonstrated leadership capabilities in the way that Americans like to see them demonstrated.

Fewer people in the construction industry than in many other callings should have been surprised at this display of initiative for they had seen it work when the President was chairman of the Senate committee investigating the efficiency, or lack of it, in war contracts. At that time it will be recalled he confused many old timers familiar with such committees by assuming that this one was supposed to reduce waste not just talk about it. His investigations were thorough and fair and always were followed by some kind of recommendation for improvement. If he was adroit at publicizing only the best of his committee's work, he also lost no opportunity to call attention to inefficiency and dishonesty.

Looking to the future in the construction industry, therefore, if it seems that bad practices can be eliminated by legislation or the police power, the President may well be expected to attempt their elimination. What he will sponsor or support in the way of public works is still uncertain although it would be surprising if he should follow the more grandiose New Deal ideas in many instances. What is to be noted as significant is that President Truman has more first-hand knowledge of the construction industry right now than any other President ever had at the end of a tenure in office! And when someone has knowledge he usually finds occasion to use it. On the President's record, he may be expected to use it wisely.

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D-Day on the Rhine

Waldo G. Bowman
Editor, Engineering News-Record
(From the European Theater of Operations)

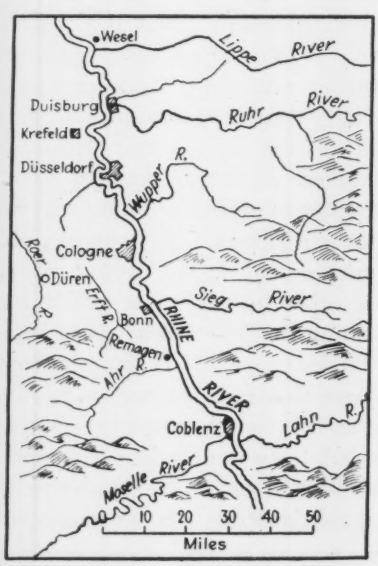
***Contents in Brief**—Reconnaissance along the Rhine in the two weeks between our surprise crossing at Remagen and the assault crossing at Wesel revealed many types of activity—and a river clogged with the wreckage of many world-famous bridges. At Remagen the steel railroad bridge was lost, but the bridgehead that it made possible was expanded with the use of pontoon crossings. Supplies were being piled up for many crossings, the first one being made at Wesel on March 24, with the greatest array of Engineer river assault equipment ever assembled at one spot. Pontoons were put across and then the first fixed bridge over the Rhine took shape in just over 10 days, a spectacular Engineer achievement.*

TEN DAYS AFTER the narrow Roer River barrier, which had constituted the front line in Germany for over two months, was breached on February 23, U. S. troops found themselves again facing the Germans across a river barrier, this time *the* barrier, the wide and famous Rhine. The prospect of forcing it so soon after the Roer, which had proved to be the most costly river assault crossing of the war, in so far as Engineer losses were concerned, might be thought to have been unpleasant to contemplate.

Quite the contrary was true. This was the job that had beckoned ever since the Normandy landings. It was the job that had been planned down to the last detail and aimed at for weeks. And it was the one for which supplies—mountains of them—had been moved eastward, step by step, as the front line had advanced. There was enthusiasm, and there was impatience to get it under way.

With the prospect of the Rhine crossing looming, and a chance to see the famous Rhine bridges, even though only as piles of wreckage, the temptation to return to the front, which we had left only on February 25, was strong. Then came the surprise crossing of the Rhine at Remagen on March 8, and the decision, March 12, to attempt the repair of the steel railroad span there. We set out on March 13.

By the time we returned to Paris on March 25, the Remagen bridgehead was secure although the great steel railroad bridge there had collapsed; the first scheduled assault crossing, at Wesel at the north end of the line, had taken place; and not long thereafter practically the whole Rhine was ours, and the drive toward Berlin had begun. How our Engineers built up the necessary supplies, made the crossings and installed the bridges will be described, analyzed and gloried-in for years to come. A start on some of the description is made herewith.

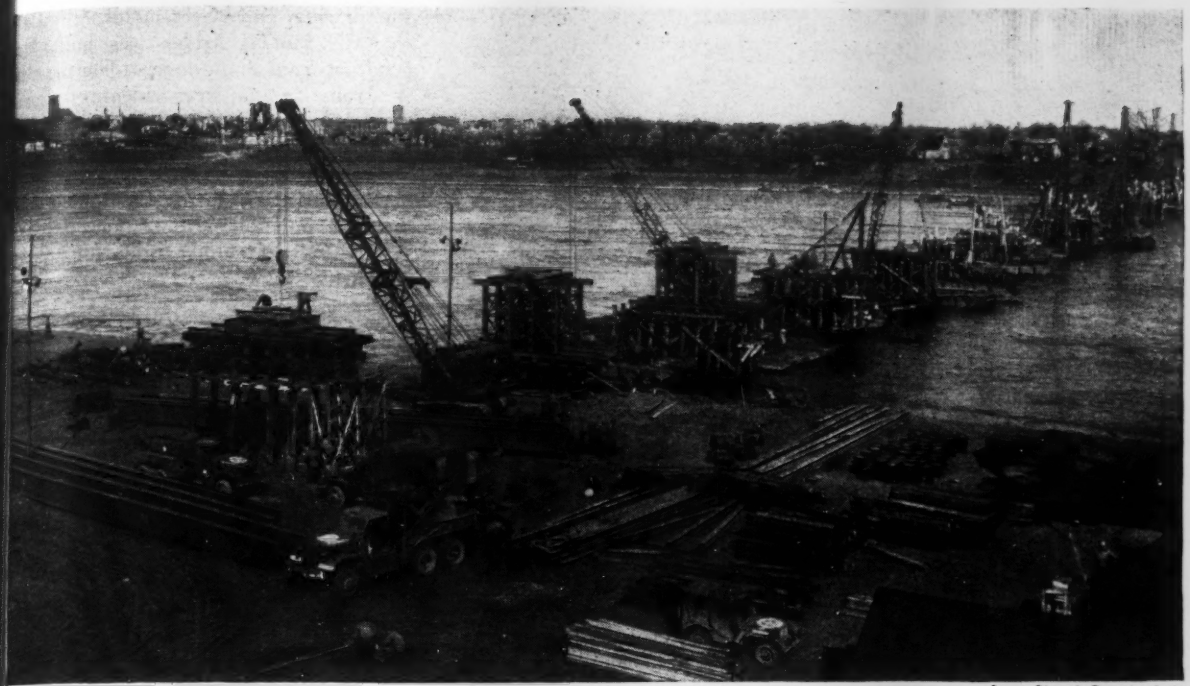


The 100-mile stretch of the Rhine, from Coblenz to Wesel, which figured in the plans for the D-Day assault.

The stage is set

Had some celestial vantage point been available during the last two weeks of March, 1945, the western approaches to the 100-mile stretch of the Rhine River from Wesel on the north to Coblenz on the south would have appeared as a tremendous stage upon which a drama of many acts was taking place. In the south, focusing on Coblenz, the Third Army was fighting its way down the winding Moselle Valley. Downstream to the north, in the sector centering on Cologne, First Army columns fanned out toward Dusseldorf and Remagen. And at the extreme north the Ninth Army set its sights below Duisburg so as to bypass the thickly-settled and industrial Ruhr valley.

All of this movement of equipment and men piled up against the Rhine barrier, and then broke over it, first suddenly and unexpectedly at Remagen, next according to plan, at Wesel, and third, also according to plan, south of Coblenz. From then on, for about two weeks, the whole river line was continuously engulfed



Army Signal Corps photo

First fixed bridge across the Rhine, the railroad crossing at Wesel, built in 10¼ days by virtue of a carefully worked out plan, a large amount of prefabrication and more heavy equipment than was ever before concentrated on a job of similar size. It contains twenty-eight I-beam spans of 75 ft. and one of 92 ft. and was built by an Adsec Engineer Group.

and the Battle of the Rhine was over.

The place we chose to enter this stage setting was Duren about 25 miles southwest of Cologne. Two weeks before, this town of 50,000 population, when viewed from our lines on the west bank of the little Roer River, had appeared to be virtually intact. Now it was gone, only rubble and gutted walls rivaling those at St. Lo and St. Vith remaining to attest to the power of our artillery.

Eastward from this devastated area, sometimes on a divided-lane autobahn or superhighway, sometimes on narrow tree-lined roads or through narrower rubble-cleared village streets moved the convoys—trucks, trailers, Ducks, tanks—carrying pontoons and piles, lumber and gasoline, bridge steel and ammunition, crawler cranes and welding generators, Navy landing barges and Army assault boats. Farther north we were not only to see this highway traffic duplicated and multiplied, but also to see it supplemented by even greater tonnages carried by freight trains to points nearer the fighting front than railroads had ever been built before.

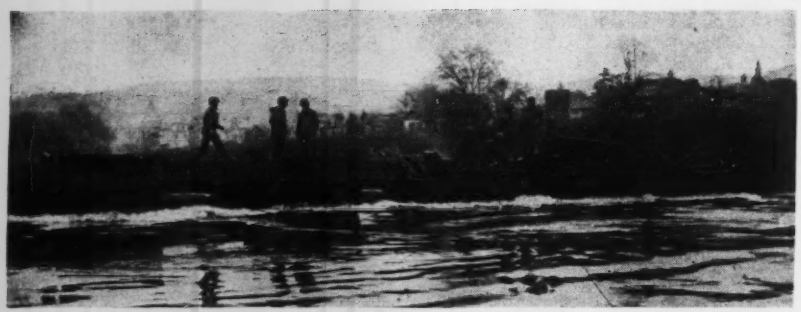
What quantities of Engineer items were massed in front of the Rhine are not known exactly, but close estimates include such figures as 5,000,000 bd. ft. of lumber, 6,000 bridge pontoons, 4,400 assault-crossing boats and 2,500 outboard motors, as well as 72 LCVP's and 52 LCM Navy landing barges. The total was probably in excess of 100,000 tons.

That part of this great supply movement in which we were engulfed was headed toward Remagen and the famous bridgehead there, whose story has been told before in these pages (*ENR*, March 29, 1945, vol. p. 413, and *ENR*, April 12, 1945, vol. p. 538) and need be recalled here only to emphasize how it contrasted with the Rhine downstream during those days that preceded the crossing at Wesel. At Remagen the Rhine valley was alive with activity—pontoon bridges being built, high courage and hard work being expended to repair the steel railroad bridge, supplies moving east across floating bridges, casualties moving west on others, air activity overhead, artillery and anti-aircraft firing from the ground.

But downstream an oppressive stillness pervaded the valley not because offensive action there was temporarily suspended so much as because the Rhine was dead, killed by its one-time worshippers, the Germans. To be sure, cities like Cologne, Dusseldorf and Duisburg, were deserted and sometimes in ruins as a result of our bombing, but rather than damaged cities it was bridges wrecked by the Germans themselves that killed the Rhine, choking its ability to act as the greatest barge waterway in the world and chaining its flow so as to invite extensive flood damage in any period of high water. As one might visit a morgue to identify the body of a friend, we set out down the Rhine to view the remains of some of the most famous bridges in the world.

Wanton bridge destruction

Although the Germans held the east bank of the river, it was possible to drive along most west bank roads, if one kept moving so as not to invite mortar and machine gun fire, and it was possible to inspect and photograph the wrecked bridges by working one's way on foot to the river's edge in the shelter of levees or road-fills in the country or of buildings in the cities. Some of the results of such reconnaissance are shown in the accompanying pictures. When one considers that the Germans did not defend the Rhine after such wanton



Pontoon bridges at Remagen. Top, our first bridge over the Rhine, a heavy pontoon reinforced with rubber treadway floats to provide extra capacity, is here being equipped with high bows to ward off waves. Bottom, deck is laid on the 1,300 ft. floating Bailey bridge, longest in the E.T.O.

destruction, and so nullified its military usefulness completely, the disordered state of the Nazi mind stands out in bold relief.

Someday someone will have to rebuild these Rhine bridges, but even as one looked at them most thoughts centered on the immediate problem of building substitutes to serve our military needs. For six months or more a prodigious amount of study and work had been expended on plans for bridging the Rhine. We had had to learn a great deal about the river and its valley, hydrologically, geologically and topographically (*ENR* April 12, 1945, vol. p. 537). We had had to design bridges that could be built quickly. And we had had to choose sites for assault crossings which not only were suitable for floating bridges, but where conditions were satisfactory for later fixed bridges. In other words there had to be approaches to the floating bridges that were not too steep, and there had to be a river bottom in which piles, preferably of timber, could be driven relatively easily and rapidly. Experts in the Office of the Chief Engineer, E. T. O., had begun the planning, and it had been carried to ultimate and definite designs by the Engineers of the Army Groups, of the Armies and particularly of the Advance Section of the Communications Zone organization.

Factors in picking bridge sites

These studies had taken into account the fact that the upper Rhine from the Swiss border to Bingen, south of Coblenz, is a torrential mountain stream where temporary bridging would be difficult; that the famous Gorge section from Bingen to Bonn is hardly less suitable because of steep banks and a rock bottom swept clean by the current except in the vicinity of the confluence of the Moselle at Coblenz where shallow gravel deposits might permit pile driving, and where incidentally Caesar's famous bridge was built; and that from Bonn downstream the river runs in an ever-widening alluvial plain where deposits of sand and gravel extend to considerable depths and where current velocities are moderate except during the January and July floods, conditions that offered the best possible opportunity for military bridging.

Plans for the fixed bridges

Obviously many a wrecked bridge on this "Middle" Rhine that we were following would be within sight of a military bridge before long. What would these military crossings look like? If it were a railroad bridge, according to the general recommendations the foundations would consist of groups of 12-in. timber piles, each pile to carry 15 to 18 tons when driven with single- or double-acting steam hammers at least 15 ft. into a gravel formation. (Some steel H-piles were also to be supplied to every job for use where unusually hard driving might be encountered, and jet pumps were to be available as a further aid in getting the timber piles down.) The piles would extend far enough above water level to permit bracing to be attached, and they would be capped so as to support a pier of prefabricated "light steel trestling." Spans would be meter beams or UCRB (Unit Construction Railroad Bridge) trusses, of deck type and of 75 or more feet in length. The fixed highway bridges would be similar, but their superstructure might be Bailey trusses.

Such would be the bridges if headquarters suggestions were followed, but unit commanders and particularly those who had become expert at railroad bridging across France were given considerable latitude in developing designs of their own. So the bridge might be founded on 65-ft. steel H-piles allowed to extend sufficiently above water (about 20 ft.) to form the piers also; or this same design might be used with hollow steel piles captured from the Germans at various bridge sites and in the Krupp plant in Rheinhausen across from Duisburg. If another of the suggested designs were used, 30-ft. long tower spans would be alternated with 85-ft. UCRB's, the "towers" consisting of the steel H-piling as above tied together with welded bracing.

Other ideas from the field related design details and to methods of ction. In the first class was an ar-gement to eliminate all welding of diaphragms or sway bracing be-en the bridge girders, a time-bot-neck on every job. It involved the of heavy timber spreaders in ce of the diaphragms and of steel nnel-and-rod yokes encircling the k to hold the girders against the readers. Used before successfully, re were many indications that this ail would be mandatory on all ine bridges where erection speed a major requirement.

Erection procedures proposed

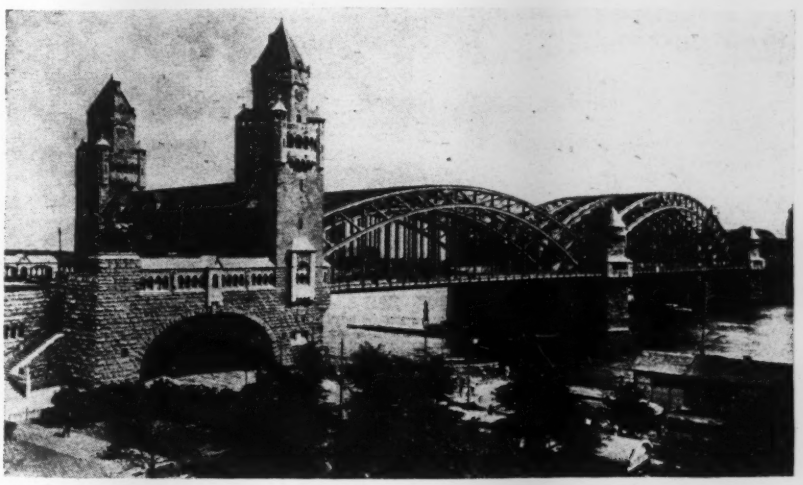
As to erection schemes, all were ed on extensive use of floating ipment mounted on barges of Sea-pontoon units. Skid-type pile vers so mounted would attack the at numerous points simultane-ly, and would be followed closely 20-ton crawler cranes or 25-ton fleg derricks, also on barges, set-the steel towers. In some schemes equipment would also place the dge girders, while in others the ders would be progressively can-vered or "launched" from shore, set by a deck traveler known as a ong Tom" because of its long over-nging boom. Still other schemes visioned the prefabrication at shore nts of complete spans which would floated into place.

Any one or all of these designs and ction schemes might be used, of rse, and since the material and ipment requirements did not differ atly, the actual choice could be until all site conditions were itively known, knowledge of which aited the results of the assault ssings. And from Duisburg north Wesel on March 22 it was obvious a crossing attempt was imminent truck after truck loaded with as-lt boats and floating bridge ma-al moved up to the Rhine past s of German civilians trudging rward out of the battle area. That ht 3,000 bombers pulverized Ger-n rear positions on the east bank, next night more than 1,200 guns loose on the river defenses, and 2 a. m., March 24, the first storm ts shoved off after being carried last 300 yd. to the bank by their -man engineer crews and their n infantry passengers. The Rhine ssing was underway, and 60 hours later every phase of the plan had unfolded on schedule.

The D-Day crossing at Wesel

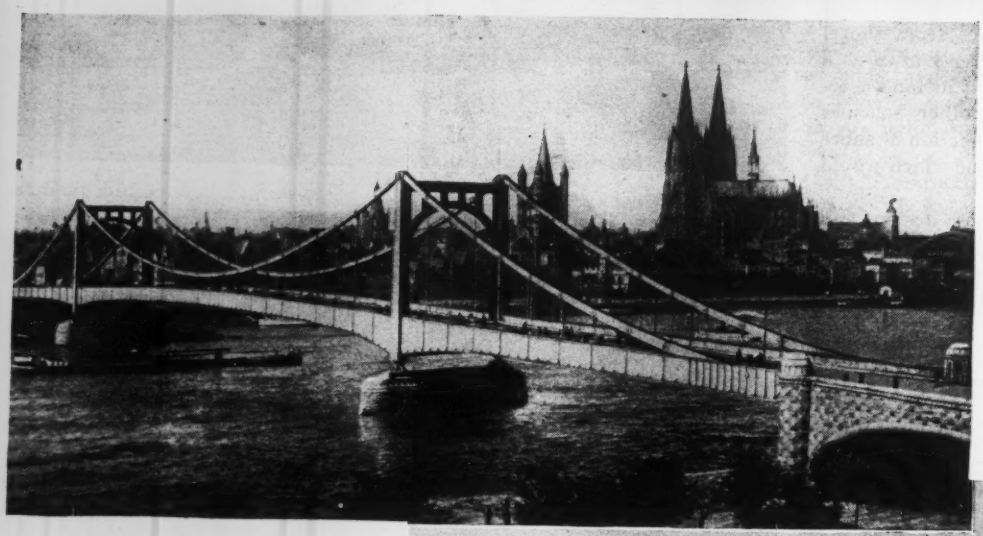
This crossing just south of Wesel was perhaps the most carefully and elaborately planned of the war. Based on past experience, it was decided that no floating footbridges or light "infantry support" bridges would be used, on the grounds that the effort to build them to the lengths required would be out of all proportion to what could be gotten across. It was also decided that the bigger floating bridges—the heavy pontoons and the treadways—would not be built so soon after the assault crossing as was the case on the Roer when small arms and mortar fire exacted costly losses. On the Rhine a substantial bridgehead would be established first, but after that the bridging effort would be tremendous—a treadway had to be in within 24 hr. after it was begun, a heavy pontoon in 28 hr. and a floating Bailey in from 40 to 60 hr. And before this period was ended, pile driving rigs would be at work on the fixed bridges.

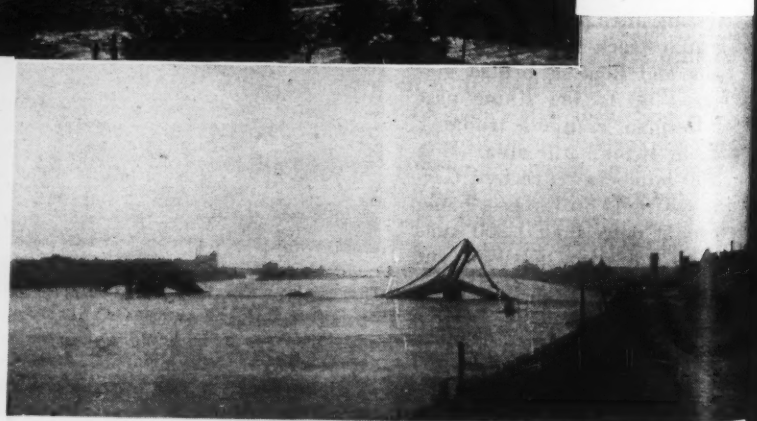
The assault itself was to be opened by the 7-man storm boats driving across the river at 25 mph. These would be followed by the assault



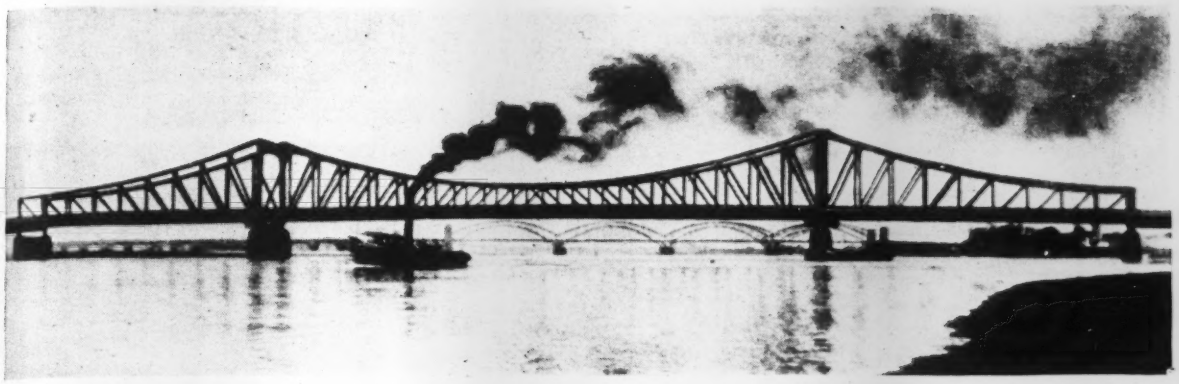
Thoroughly wrecked by German demolition charges, the famous Hohenzollern Bridge at Cologne contrasts sharply with its majestic prewar appearance. Actually three separate bridges, two railway and one highway, its span lengths are 390-544-402 ft. The original pointed roofs of the towers were removed to provide platforms for flak guns. More pictures of wrecked Rhine bridges, taken by the author, are shown on next three pages.

The South Bridge at Cologne before and after its demolition by the Nazis. A railroad bridge of three tied arches, 333-540-333 ft., it dated from 1911.



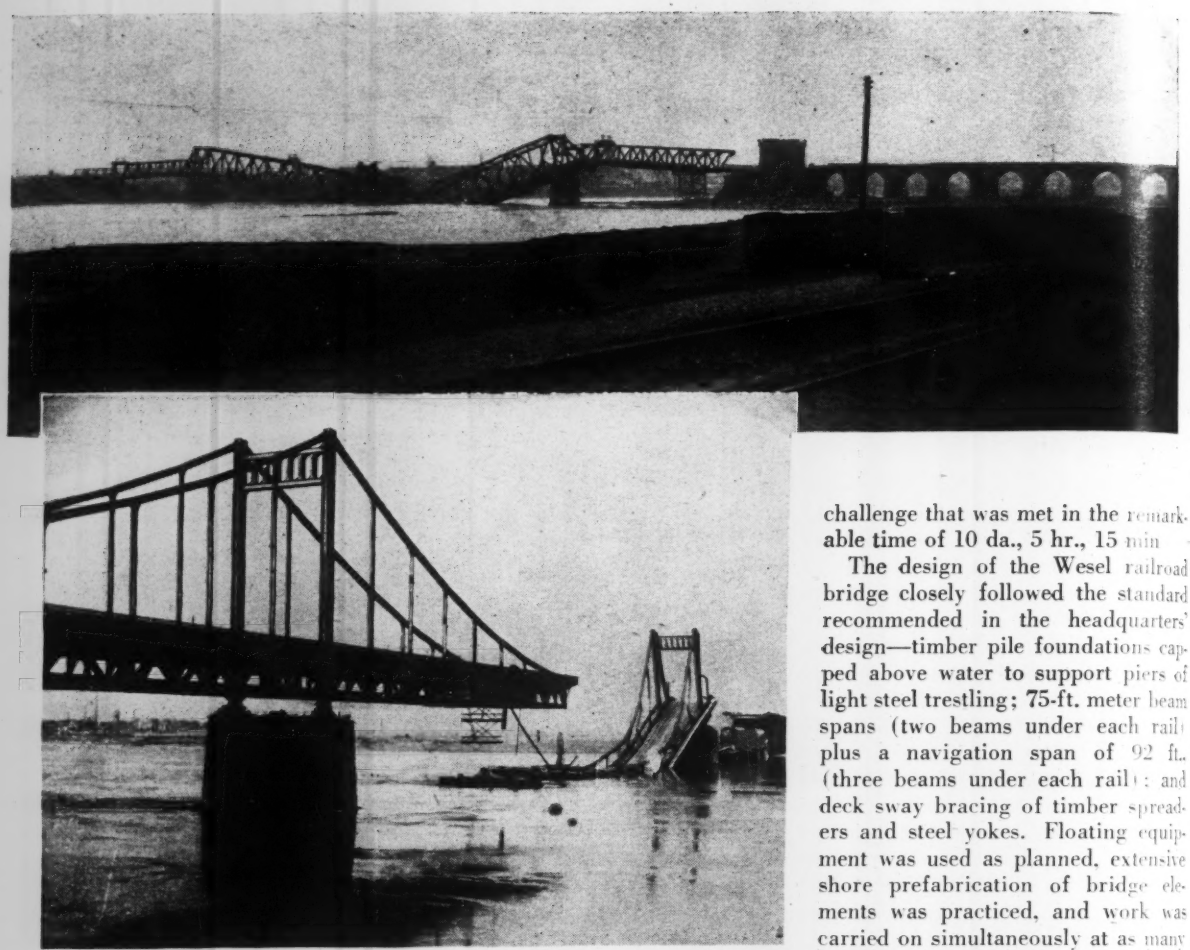


Tragically destroyed (right) was the Cologne-Deutz self-anchored suspension bridge, a handsome vehicular structure in a beautiful setting, as shown in the prewar view above. Built between 1913 and 1915, it had a main span of 605 ft., side spans of 302 ft. and nickel steel stiffening girders and plate link chains.



Both the Dusseldorf-Neuss highway bridge, a 676-ft. span cantilever completed in 1929, and the Dusseldorf-Hamm railroad crossing, consisting of two parallel bridges each of four 352-ft. tied arches, dating from 1912, are portrayed above as they appeared before the war. Now they are piles of wreckage in the Rhine, as shown in the views at the right.

Not much is left of the largest cantilever bridge in Germany, the highway crossing between Duisburg and Homberg. Completed in 1907, it had span lengths of 296-405-678-427-279 ft. from end to end, and was 54 ft. wide.



Two unusual Rhine bridges that were blown by the Germans. The Duisburg-Hochfeld bridge (top) had two main spans 620 and 413 ft. long and 65 ft. deep that cantilevered one panel beyond their end supports to be continuous with 341 ft. end spans, which were only 32 ft. deep. The Adolph Hitler Bridge (bottom), at Krefeld-Uerdingen, combined suspension and cantilever action to achieve stability.

boats, powered by outboards at each end and carrying 15 infantrymen and a crew of 3 engineers at 11 mph. Third in the list of crossing vehicles would be the LVT's (Landing Vehicle, Tracked) or "water buffalos", sometimes known as "alligators". Then would come the Navy's LCVP's (Landing Craft, Vehicle Personnel) with more troops and light equipment, and the LCM's (Landing Craft, Mechanized) with tanks. Soon thereafter, ferries, composed of Seabee pontoons, treadway bridge pontoons or Bailey bridge pontoons, would go into service, also bringing tanks and other heavy, bulky equipment.

This was the assault phase as planned, and there was hardly a variation in its execution. By mid-morning of March 24 the river was alive with craft of every sort, and troops were already a mile inland on the east bank, permitting the floating bridges to be started on sites practically free of any opposing fire.

The floating bridges across the Rhine at Wesel were, therefore, pushed across with great speed, almost as in maneuvers, and even before they were in service the railroad bridge builders were moving down to their site. Here, however, conditions proved not to be as favorable as had been hoped, and a shift to a new location 1,500 yd. upstream was necessary. Instead of a 1,350-ft. bridge, as planned, it was necessary to build a 1,752-ft. bridge over the river and another of 463 ft. over a canal, a challenge that was met in the remarkable time of 10 da., 5 hr., 15 min.

The design of the Wesel railroad bridge closely followed the standard recommended in the headquarters' design—timber pile foundations capped above water to support piers of light steel trestling; 75-ft. meter beam spans (two beams under each rail) plus a navigation span of 92 ft. (three beams under each rail); and deck sway bracing of timber spreaders and steel yokes. Floating equipment was used as planned, extensive shore prefabrication of bridge elements was practiced, and work was carried on simultaneously at as many as fifteen locations along the bridge.

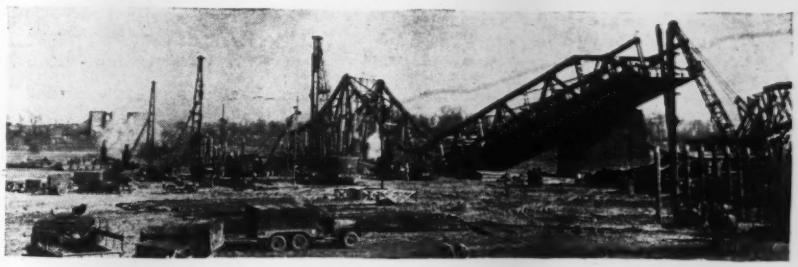
The accompanying pictures, on pp. 97 and 103, give some idea of the tremendous concentration and coordination of effort that was brought to bear on this job. And as a result, a train rolled across the Rhine on April 8, just 15 days after the assault crossing. No matter when V-E day comes, that event signified victory to the Engineers in the E. T. O. Looking at the Rhine, any one of them could say with Caesar, another Rhine builder of note: "*Veni, vidi, vici*".

Post Script

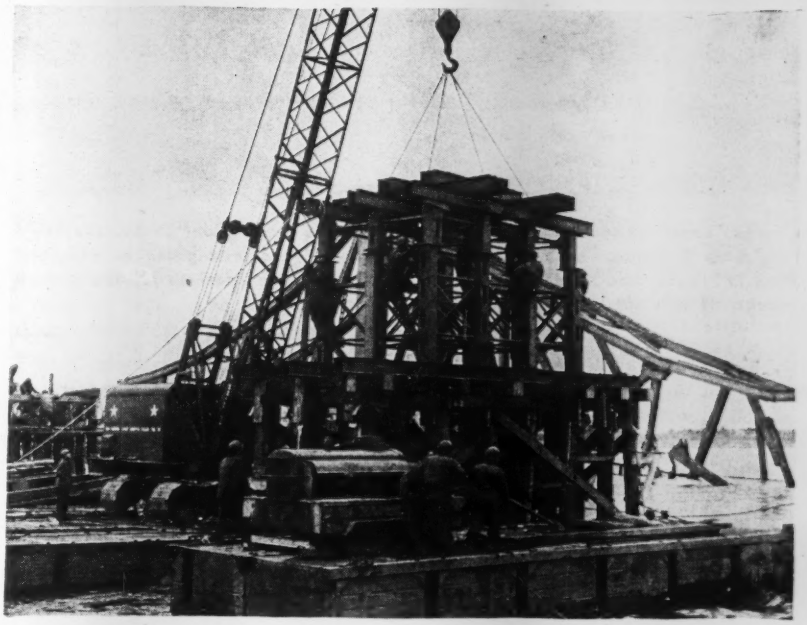
Censorship restrictions at the time this was written precluded free use of the names of those in charge of the various operations. Even yet complete freedom is lacking, but the following top personnel can be revealed. For Adsec, Col. E. C. Itschner is chief engineer, Col. A. H. Davidson deputy, and Col. W. B. Higgins head of the railroad section. For the Ninth Army, which made the crossing at Wesel, Col. R. U. Nicholas is engi-

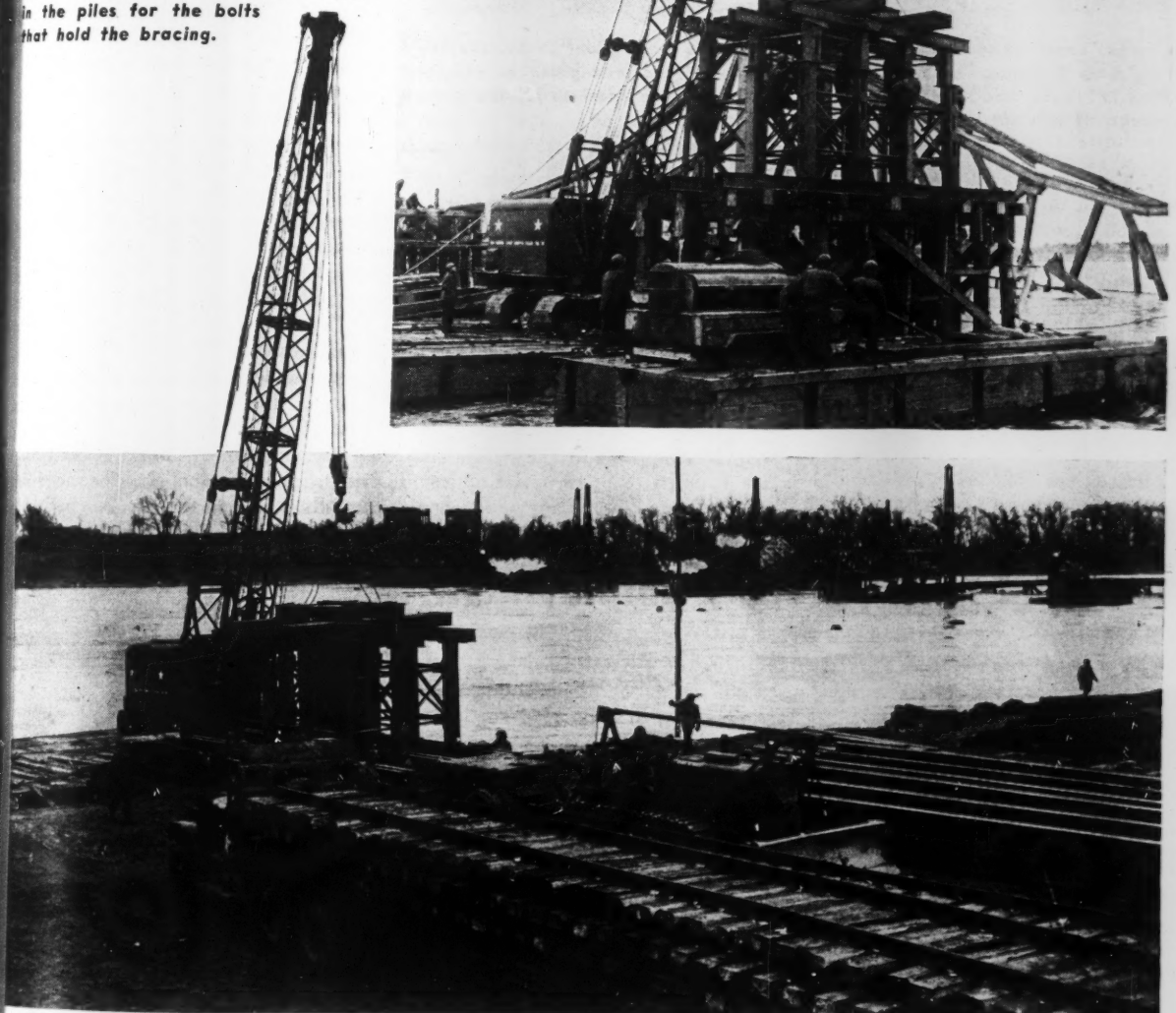
First Fixed Bridge Across the Rhine, The Railroad Crossing at Wesel

Alongside the wreckage of the highway bridge at Wesel U. S. Engineers begin the first railroad bridge across the Rhine, completed 10 days later. (See also later photo on p. 97). Hammers in hanging leads from 20-ton crawler cranes drove the land piles, while skid drivers on barges put down those in the river.

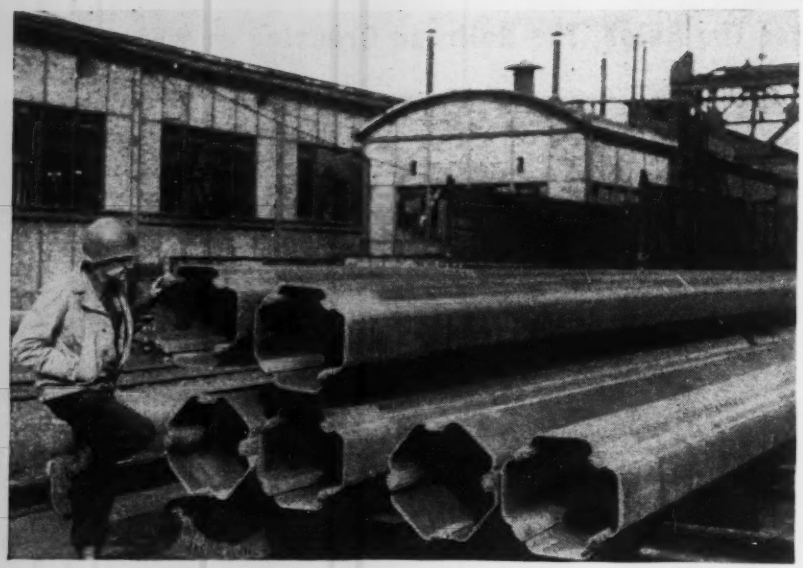


At a pier site, a light steel trestle tower is lifted onto the capped timber piling. The skid-mounted compressor on the barge in the foreground was used to operate drills that bored holes in the piles for the bolts that hold the bracing.





Prefabricated bridge elements are brought to the river's edge as five floating pile drivers in the background prepare the piers to receive them. The 20-ton crawler crane is transferring an assembled tower of light steel trestling from a trailer to a pontoon barge on which it will be moved to a river pier and then lifted into place. Similar handling is in store for the 75-ft. meter beams and the completed sections of ties and track.



The author examines some hollow welded piling in the Krupp plant at Rheinhausen across from Duisburg. U. S. Engineers used similar captured piling on several bridges in France, and included it in some of the proposed designs for the Rhine crossings. It was not planned to fill them with concrete.

neer, and Col. David McCoach III deputy. For the First Army, in whose zone the Remagen bridgehead was located, Col. W. A. Carter is engineer and Col. Carlton P. Roberts deputy. For the Twelfth Army Group, which included the First and Third Armies, Col. P. H. Timothy is engineer and Col. R. W. Pearson deputy. The bridge at Wesel was built by an Adsec Engineer Group headed by Col. James B. Cress, which included the 1056 Port Construction and Repair unit and the 355th General Service Regiment. In Headquarters, Communications Zone, Maj. Gen. C. R. Moore is chief engineer, Col. J. R. Hardin deputy chief engineer, Col P. D. Berrigan chief of the construction division, and Col. C. C. Haug head of the transportation section.

Timing of Public Works Construction Essential to Postwar Re-Employment

With proper timing, the $4,827,000,000 in proposed postwar construction of public works on the part of the federal, state and local governments in California can be made to supplement private construction employment in the transition to peacetime economy, according to a report to the California legislature by the State Reconstruction and Re-employment Commission.

The report recommends:

That the whole subject of timing, distribution and scheduling of public works programs in the state be given thorough study by the commission, under legislative authority, conferring with and advising officials of all branches of government.

That the policy of providing funds for planning of state projects in advance of construction appropriations be continued and that a six-year state building program be prepared and adopted.

That further study and planning for financing of state public works be initiated without delay.

That the legislature designate an appropriate executive agency of the state to review and study proposed federal projects in California to determine needed federal improvements.

The report points out that of the total suggested postwar public works expenditures in California, more than 70 percent is still in the proposal stage; that in the local governmental group only 3.5 percent of the proposed projects are financed; that the state has insufficient money in the postwar employment reserve to finance its own urgently needed construction projects for institutions and highways.

The breakdown of the totals of proposed postwar public works projects compiled in the report is as follows:

Federal	$1,536,000,000
State	951,000,000
County	719,000,000
City	1,443,000,000
Other local special projects	178,000,000

With respect to the state projects, it is pointed out that funds have been provided for less than 50 percent of all needs other than highways and that funds are available for less than 15 percent of the state highway improvements urgently needed during the first three postwar years.

Col. Alexander R. Heron, state director of reconstruction and reemployment, emphasized the role of public works as a supplement to private building construction, when and as needed to help maintain a high level of employment. He said:

"The construction industry has gone to war and cannot be converted to large-scale peacetime operations all at once. Increasing the stability of construction employment through better coordination of public works with private construction will be needed more than ever in the postwar period.

"If private building revives on a large scale immediately after the war, public construction should be carefully timed to avoid rising costs and creating bottlenecks in the flow of materials, equipment and skilled labor to private work.

"Under favorable economic conditions, it is estimated that the construction industry may provide jobs for as many as 220,000 persons in California within a year after general military demobilization. This would represent approximately 7 percent of the 3,200,000 maximum total employment estimated for California in the first postwar year.

"Although private enterprise should have the right-of-way in postwar construction, some public works projects will give real impetus to private industry and such public works should be built as soon as possible."

A DESIGN for POSTWAR CONSTRUCTION

Rigid-Frame Concrete Span Requires No Falsework

Jacob Feld
Consulting Engineer, New York, N. Y.

***Contents in Brief**—Falsework will be unnecessary during construction of a concrete rigid-frame grade separation bridge, which is so designed that concrete forms may be hung from the structural steel frames comprising the permanent reinforcement. Contract drawings are ready for early postwar construction of the project in the Borough of the Bronx, New York City.*

AN UNUSUAL and economical design for grade separation bridges is seen in contract drawings for postwar construction of a rigid-frame reinforced concrete span where structural steel frames will give dual service as support for concrete forms and as permanent reinforcement. The proposed structure will carry Castle Hill Avenue, a 100-ft. wide street, over Bruckner Boulevard in the Borough of the Bronx, New York City. The latter artery is a six-lane divided throughway.

Spanning 80 ft. 6 in. between abutments, the bridge will provide clearance over the throughway for two 34-ft. roadways, a 5-ft. mall, 3 ft. on each side for clearance and emergency walks, and 9 in. of stone covering on each leg of the rigid frame. Included in the bridge width of 100 ft. are two 15-ft. sidewalks, two 32-ft. roadways and a 6-ft. center mall. The mall covers a gap in the bridge structure wherein is provided space for an existing 42-in. gas main.

Utility lines concealed

Proper drainage slope is provided by having the lower roadway at an elevation that permits discharge into the existing sewerage system. A minimum clearance of 14 ft. is to be allowed over the entire lower roadway. Also, cover is provided over the rigid frame sufficient for a 12-in. gas main, a 12-in. water main and several utility ducts, all of which are to be laid under the sidewalks.

On the throughway, traffic lanes are to be paved with reinforced concrete, mall and emergency walks are to be brick surfaced and curbs will be concrete faced with steel. On the bridge, the street surface is to be asphalt, with steel-faced concrete curbs. Concrete sidewalks will be provided and concrete-filled street grating will cover the mall. The mall grating is designed to carry all loads across the gap to the bridge structure.

Plans call for bridge frame and all approach retaining walls to be covered with stone ashlar, capped by granite copings and ornamental steel railing.

Design of steel frames

Experience gained in the construction of rigid-frame reinforced concrete bridges reveals that three operations are costly: (1) Supporting arch forms on falsework; (2) bending and placing long and heavy bars; and (3) separating and holding in proper position the intrados and extrados reinforcement layers.

All of these operations can be eliminated, with a considerable saving in time and cost, by the introduction of welded structural steel angle frames as reinforcement. The structural steel frames are first designed as rigid frames to sustain the weight of forms and wet concrete. When the concrete has set, the structure becomes a reinforced frame, the structural angles acting as reinforcement in both faces.

Thus all falsework timbers are dispensed with, since the forms can be hung from the steel frames. Likewise, the transverse bar reinforcement for temperature stresses is very simple and the welded diagonals of the frames separate and fix the location of the chord members. Concreting is much simpler than in rod designs because of the easier placing and vibration operations in the less obstructed assembly.

Design of the completed rigid frame is based on dead loads plus a uniform load of 350 lb. per sq. ft. to cover live load and impact. Checking for H20-S16 loading in all lanes, and also for a local requirement of 25-ton (80 percent on rear axle) trucks in all lanes, reveals that the uniform load is more severe at all sections and also shows stresses higher than exist in the steel frame under the construction loadings. Therefore no additional steel is needed to take care of the wet concrete construction load condition.

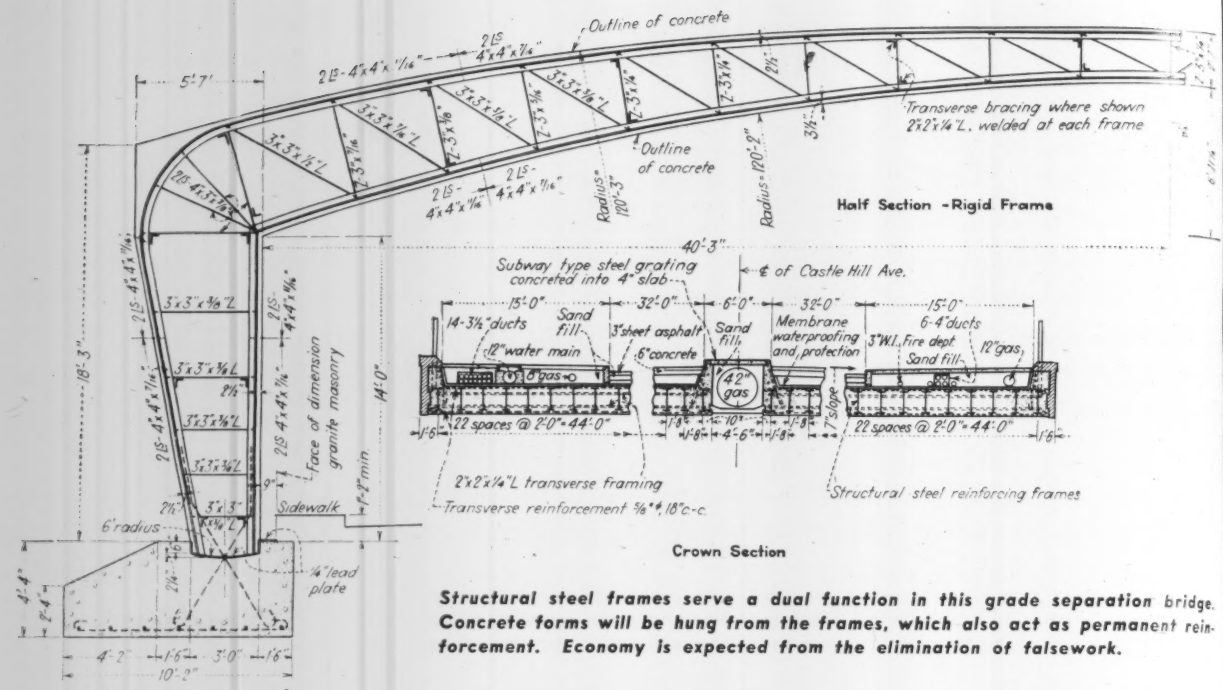
Maximum tensile stresses in the steel at the haunch and at the crown are 19,000 psi. and 18,600 psi. respectively. Maximum steel compression is 17,500 psi. at the haunch and 16,500 psi. at the crown.

Steel ribs on 24-in. centers

Structural steel ribs are spaced 24 in. on centers and are formed of double 4 x 4-in. steel angles in each chord, $\frac{11}{16}$ in. thick at the knee and $\frac{7}{16}$ in. elsewhere. Diagonals are single angles and the struts are Z bars. Cross frame bracing is provided for erection stability in each of four sections between pour joints.

Deflection of the steel frame under concrete load only is 0.90 in. and the arch shape is compensated by cambering the steel frames 1 in. above the desired shape at the crown. By introducing a continuous recess in the footings, no special anchor bolts are needed for erecting the arch ribs. A thin lead plate separates the footing from the bridge structure, thus providing for maximum possible rotation of the legs.

Footings will bear on a heavy glacial gravel deposit a few feet above mica schist rock and are dimensioned for uniform base pressure of $3\frac{1}{2}$ tons



Structural steel frames serve a dual function in this grade separation bridge. Concrete forms will be hung from the frames, which also act as permanent reinforcement. Economy is expected from the elimination of falsework.

under dead loads. Live loads introduce slight eccentricity of base pressures.

This bridge was designed by Jacob Feld and John V. Timoney, New York consulting engineers, for the Borough of the Bronx, where the postwar program is under the direct supervision of James J. Lyons, borough president, and Arthur V. Sheridan, commissioner of borough works. Thomas B. Dyer, chief engineer and Ernest F. Fox, engineer of design, control the standards and coordination of the various postwar projects of the borough.

Brazil to Develop "TVA" Project On San Francisco River

A hydroelectric power project has been projected for the Paulo Afonso Falls on the San Francisco River that will be modeled in certain respects after the Tennessee Valley Authority in this country. The proposed development will be under the direction of Brazil's Minister of Agriculture, Dr. Apolonio De Sales, who visited the Tennessee valley and studied the development there last year.

Plans for this work foresee the formation of the Cia. Hydro-Eletrica Nacional do Sao Francisco, with a capital of approximately $20,000,000, one-half to be subscribed by the Brazilian Government. On the strength of this understanding, the Brazilian Department of Agriculture will advance the new company approximately $2,000,000 for preliminary work—studies, plans, etc.

Generating of current, it is said, will be possible five years after construction is started, with an initial capacity of 110,000 kw., and additional capacity, up to 440,000 kw. total, to be provided as needed.

One main transmission line will run from the installation of Paulo Afonso to Caruaru, Pernambuco, the central point of distribution for the states of Alagoas, Pernambuco and Paraiba, with branches from Caruaru to Maceio and Joao Pessoa, while a second main line will run from Paulo Afonso to Cipo, Baia, with branches from Cipo to Aracaju, Sergipe, and to Salvador, Baia. The cost of these main transmission lines will be met by the states served, according to reports.

Distribution of current to local users will be provided for along lines such as those set up by the Tennessee Valley Authority, and it is expected that the present average wholesale price of five cents (U.S.) per kilowatt hour in this region will be reduced to one-half cent per kilowatt hour.

The promise of abundant cheap electric power, for any and all users, is expected to make the entire area, within reach electrically, of Paulo Afonso, attractive to industry and colonization.

Although detailed plans for the hydroelectric power project are only in the making, it has been indicated by the Minister of Agriculture that water for the power plant will be taken from the river a little above the Paulo Afonso Falls and carried about two miles to the site of the proposed plant. With the then available head of 207 ft. it will be possible to develop an eventual capacity of 440,000 kw. without the necessity of resorting to water storage.

The first installation will consist, it is reported, of two 55,000-kw. generators and of approximately 500 miles of high voltage feed lines.

The Paulo Afonso Falls are 140 miles from the mouth of the river. The height of the falls is 265 ft. and the annual mean volume of water is about 100,000 cfs.

ig. 1. Long trailers transport sectionalized FPHA houses 260 miles to provide war workers' homes near Detroit.

House Moving Day for the F P H A

***ntents in Brief**—Despite heavy snows and sub-zero temperatures the deral Public Housing Authority is alleviating a severe shortage in housing colored war workers in the Detroit metropolitan area by moving 109 HA houses, no longer needed to serve the Ravenna ordnance plant in theastern Ohio, to Royal Oak Township, Mich. Although built originally permanent two-story timber buildings they are being successfully trans-red to the new site by panelizing the second story and sectionalizing the ts and lower story for transportation by truck and trailer to the new site.*

T MANY YEARS AGO house moving an arduous task, painstakingly w and often necessitating tem-rary street closures along the route versed. Today, modern equipment d methods have both speeded up d simplified the procedure. One tstanding example of mass house oving is the current undertaking by e Federal Public Housing Authority dismantle, transport and reerect 9 timber-framed houses containing 0 family units from Windham, hio, to the new site just outside of etroit—a distance of 260 miles.

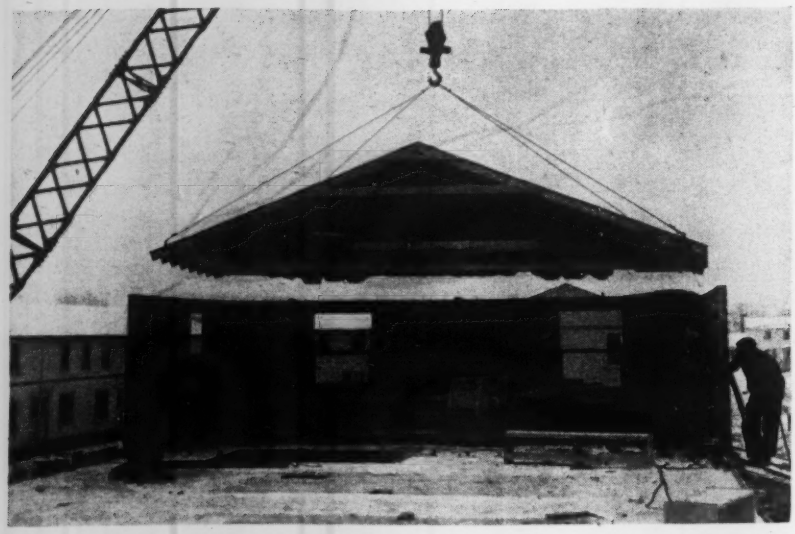
The most complicating factor in the entire operation is the fact that the houses had not been built as demountables. When originally constructed, no thought was given to the possibility of their ever being moved. Methods employed to disassemble them are of singular interest while their successful transportation in the dead of winter and subsequent reerection proves the feasibility of house moving on a mass basis, particularly when necessitated by wartime housing requirements.

Moving the 590 units was motivated by the critical need for additional housing for negro war workers in the Detroit metropolitan area. The buildings are being incorporated as a part of a large negro housing commmunity covering eight city blocks being built by the Federal Housing Authority and situated between two large industrial districts in that area.

Conserves building materials

No claims are made as to the economics of providing low-cost housing by this method; rather it is a question of conserving building materials by transporting war workers' homes from an area where they are no longer required to one where their need is urgent. Two lump sum contracts cover the work; one of $1,337,500 for dismantling, transporting and reassembling the 109 houses and the other of $324,000 for preparing the new site, landscaping it and installing electric, sewer and water services.

In general, the houses are two-story, although some have a one-story single unit at each end. They were built



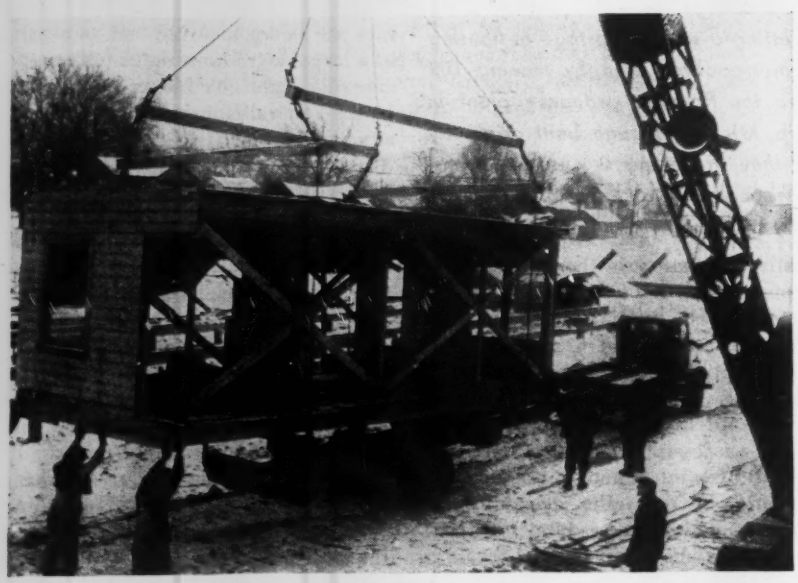


Fig. 2. Three basic steps constitute the dismantling: Removing the roof sections (top), panelizing the second story (center), and sectionalizing the lower story for transportation by truck and trailer (bottom).

originally in four basic types; [illegible] four, six and eight units (fa[illegible] dwellings) per building. All are [illegible] ft. 7 in. wide. The total length va[illegible] from 32 ft. for a two-unit hous[illegible] 141 ft. 6 in. for eight units. E[illegible] unit contains a combination kit[illegible] and dining room, a living room[illegible] bathroom and from one to four b[illegible] rooms. Each unit also has its [illegible] heater room containing a coal h[illegible] ing forced-blower hot air furnace, [illegible] a small coal storage room built [illegible] the back of the house.

Although the houses were not h[illegible] as demountables, the arrangement [illegible] their structural framing permit[illegible] panelization of the upper story a[illegible] sectional cutting of the lower st[illegible] and roof. At the start of the job t[illegible] houses were completely panelized b[illegible] fore moving, but the cost of th[illegible] method was considerably in excess [illegible] that finally adopted.

Structural framing

Foundations for the houses a[illegible] made up of three longitudinal lin[illegible] of 2x10 and 2x12-in. timbers su[illegible] ported by 6x6-in. wood posts set [illegible] concrete footings below groun[illegible] Floors are ¾-in. semi-finished oak [illegible] ¾-in. sub-flooring, carried by 2x10-i[illegible] joists spanning one-half the width [illegible] the building. Both the ceiling an[illegible] roof rafters are 2x6's. Roofs a[illegible] asphalt strip shingles on a 90-lb. roo[illegible] ing paper supported on wood sheath[illegible] ing. Partition and exterior wall stu[illegible] are 2x4's, with the latter built ori[illegible] inally as balloon framing, extendi[illegible] from the ground floor to the roof. I[illegible] the re-erected buildings the exteri[illegible] framing is substantially platfor[illegible] framing since 2x4-in. timber plat[illegible] are added at the second story "cu[illegible] line" to provide adequate rigidity.

Drop siding covers the exterio[illegible] Ceilings, partitions and interior wal[illegible] are finished with ⅜-in. gypsum plaste[illegible] board. Chimneys were built of 8x1[illegible] in. cinder block, and windows ar[illegible] double-hung, timber framed. All ma[illegible] terial in the houses at Windham [illegible] being moved to Detroit and reas[illegible] sembled except the chimneys, foundat[illegible] tion posts and part of the supporti[illegible] timber girders. This material is be[illegible] ing installed new.

Cut into sections and panels

Dismantling the houses consist[illegible] basically, of cutting the roofs into sec[illegible] tions 8 ft. wide, panelizing the secon[illegible]

story walls and partitions, and cutting the lower story into sections not over 12 ft. wide; the maximum width permitted on Ohio and Michigan highways.

Before dismantling any house the several sections into which it is to be cut are match-marked to facilitate re-erection. These markings include the house number and the order of removing the various sections. Roofs are cut transversely, close to a rafter, and a false rafter is added at each joint to support the adjacent sheathing. As originally constructed, the rafters were supported on a plate made up of two 2x4's laid flat, spiked together and nailed to the top of the exterior wall studding. During dismantling, these 2x4's are wedged apart sufficiently to permit sawing the spikes in two, leaving the upper timber nailed to the rafters and the lower 2x4 fastened to the studding.

Panelizing the top story

First operation in panelizing the second story walls and partitions is to remove one or two entire lines of siding at the second floor level. Interior trim is removed by driving the existing nails completely through the plaster board, exposing the second story studding. Two horizontal saw cuts then are made through each stud; one 3 in. above the second floor and the other 1⅝-in. higher. This permits the installation of a 2x4-in. wall plate, spiked on top of the first floor studding and supporting the second story studs, to convert the re-erected buildings from balloon to platform framing. Timber jigs, laid flat on the second floor, insure the accuracy of cutting the studs.

End walls are cut vertically at each corner of the second story making sections 25 ft. 7 in. long, equal to the width of the house. Side walls and partitions are cut adjacent to a stud and into various length panels to miss the interior doors and windows. The latter are left in place in the wall panels and lower story sections and moved to the new site. In general, window breakage averages not more than two per house. Panel sections are loaded flat onto trucks and trailers by crawler type cranes and securely snubbed ready for the long trip to the new site.

At the start of the job only three roof sections were hauled on a 60-ft. flat bed trailer. Two were placed end

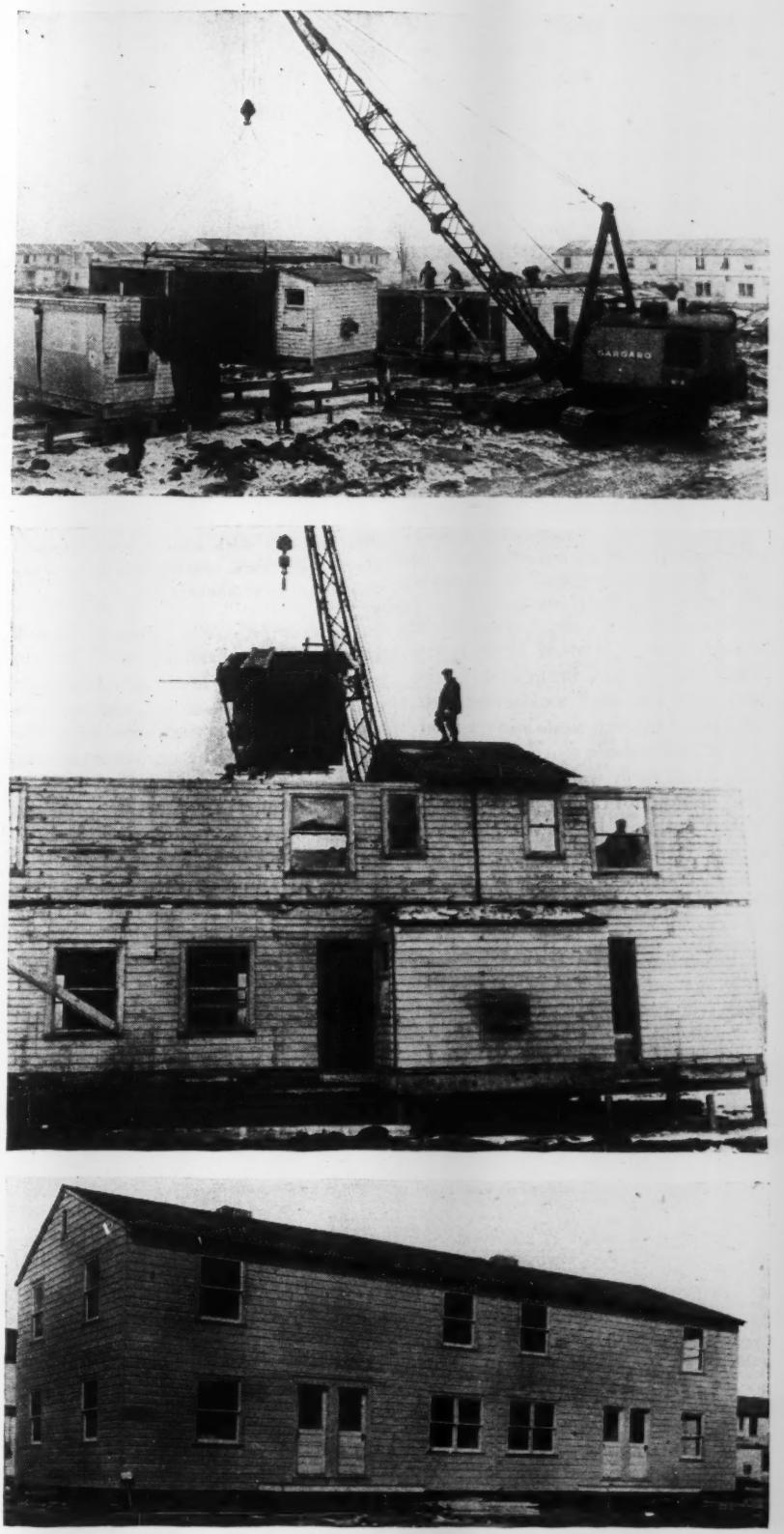


Fig. 3. During re-erection, first floor sections are placed directly on the new foundations (top), upper story panels are erected and roof sections lifted into place (center), forming the completed house (bottom).

to end in an upright position while the third was inverted and lowered into the V-notch formed by the sloping roof surfaces of the other two sections. In order to increase the pay load of roof sections the trailers were subsequently equipped with side-arm supports welded to the trailer beds in such a manner that six roof sections could be hauled at one time. They were stood on edge, making the height of the load equal to the 8-ft. width of the sections.

Lower story box sections

The lower story, including the second floor, is cut into box sections by sawing both floors within ¾-in. of a joist and adding a nailing strip at each cut. Exterior walls are cut close to a stud, while interior partitions and stairways are left in place. Final step in dismantling is to cut the sections loose from the foundation immediately below the floor joists.

When loaded on the trailers these sections make a load of 12-ft. maximum width, 25 ft. 7 in. in length (the width of the house) and about 9 ft. 6 in. high. Sections containing a heating unit and outside storage room are 30 ft. long, each weighing 11½ tons. Light diagonal bracing is tacked to exposed framing to prevent the box sections from becoming wracked while in transit.

Electric conduit and wiring, as well as water piping, are cut at the joints in the timber framing and left in place in both the lower story sections and second story panels. Leaving these service facilities intact minimizes the amount of re-wiring or water pipe installation in the reassembled houses. It is necessary, of course, to splice the wiring, weld the conduit and joint the piping where they have been cut.

Fig. 4. Floors, exterior walls and studding are cut with power saws, supplemented by hand sawing wherever conditions make it necessary.

Special slings were developed on the job to load the lower story sections onto the trucks at Windham and to unload and place them on the new foundations at Detroit. Chief requirement of the sling was that it should be capable of handling the sections without inducing undue stresses in the timber framing. To insure this, a four-point pickup was provided by running four ¾-in. cables from the boom hook down to engage heavy steel straps encircling the ends of two 6x6-in. by 16-ft. oak timbers located about 3 ft. above and paralleling the long dimension of the sections.

Four similar cables extend down from the steel straps with end hooks engaging the ends of two 14-ft. lengths of railroad rails placed transversely beneath the first floor joists to support the sections. The rails are placed in an inverted position to give a good bearing against the joists. Two 6x6-in. by 14-ft. timbers inserted between the lifting cables just below the longitudinal struts serve as spreaders.

Transportation was a problem

Although dismantling the houses was an intricate procedure requiring considerable ingenuity on the part of the contractor, one of the serious problems at the start of the job was to transport them the 260 miles to their new location. Dismantling started on November 15, and so did the snow. Although both the Ohio and Michigan state highway departments permitted truck loads to be 12 ft. wide, loads of this width could be moved only when the full width of pavement was open to traffic. Moreover, loads could be moved only during daylight hours. Average driving time between the two sites is 10 hours.

The heavy snowstorm which started coincidently with dismantling soon closed the roads to a stage where the trucks could not operate safely. At the beginning of the job, transportation was held up 57 days waiting for the roads to be cleared. Despite this delay the project is scheduled for completion June 1. Hauling is performed by a fleet of 80 units. Including are: semi-trailers; 60-ft. flat bed trailers for roof and panel sections; and low-bed, gooseneck trailers, 55 ft. long, to safely pass the box sections beneath highway underpasses.

Extra precautions are necessary to avoid damage by rain and snow to exposed interior material from the time a house is dismantled until it is re-erected. This is particularly important

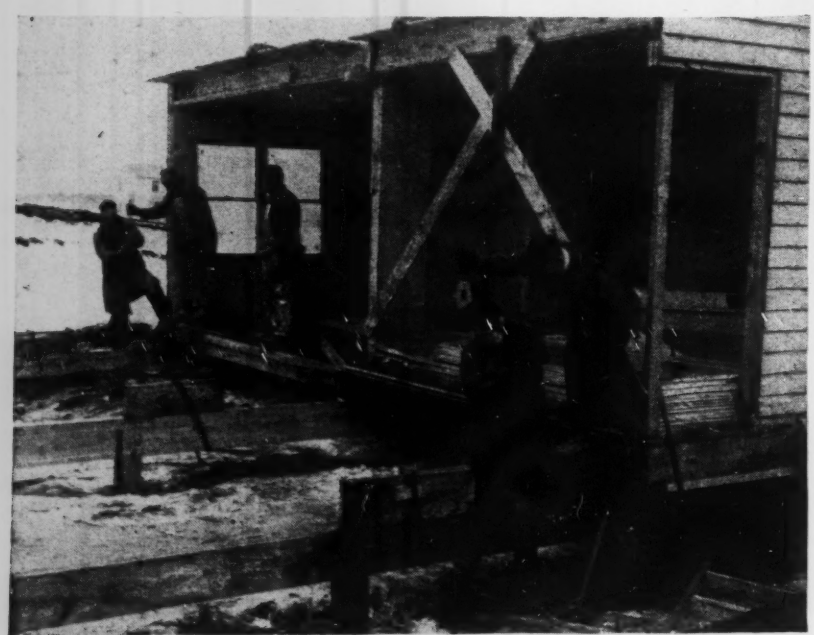


Fig. 5. Each first floor section is jacked so tightly against the previously erected one that joints are barely noticeable.

6. Three panels of roof sections plus some second story panels made a trailer load. Later the trailers were equipped haul 6 roof sections by standing the sections vertically.

prevent buckling of the oak flooring discoloring of the interior wall finh should they become wet. Several ndred square yards of tarpaulins e needed for this protection.

Strict inventories are made of all terial loaded at Windham and carefly checked against the truck loads on arrival at Detroit to minimize ses during transit. An eight-unit use makes 23 loads; 16 loads of box ctions, 4 of roof sections and 3 ds of panels.

Sections trucked on schedule

To eliminate all waste motion in ading and unloading, the several ctions of each house are dispatched om the old site in proper sequence. oof sections necessarily are disantled first, followed by panelization the second floor framing. But the st end box section to be removed is heduled to arrive first at the new e. It is transferred directly from the iler onto its prepared timber foun-ation. The adjacent section arrives xt. It is placed on the foundation d jacked tightly against the end tion with two 20-ton jacks bearing ainst jacking-blocks snubbed to the uble 2x12-in. timber girders formg the foundation. This procedure is ntinued until the lower story has en completely reassembled.

Second story panels are re-erected like manner, being lifted directly o place from the loaded trucks. oof sections are removed and temrarily stored on the ground adcent to the new foundation. They e later erected by crane as needed.

Despite the extensive cutting and panelization necessary to dismantle the houses their re-erection is usually carried out without incident, and the final product shows very little evidence of having been disturbed. Moreover, relatively little new material is required other than timber posts and supporting girders in the foundations, cinder block chimneys and new porches. The false floor joists, additional second story studs, ceiling stringers and rafters required at the points of cutting are a relatively minor item compared to the size of the houses.

Waterproofing the joints

Special care is taken to waterproof all exposed joints in the outside walls and roofs. The vertical cuts in the exterior walls are caulked with a caulking compound and covered with a light timber batten. Joints in the roof are caulked and covered with a 16-in. width of 50-lb. roofing paper. Asphalt strip shingles then are laid over each joint to make it waterproof.

Since speed is the keynote of the program, adequate labor is employed to keep the 80 trailer transport trucks in full operation. Some 85 carpenters and 28 laborers are dismantling the houses while a crew of 100 carpenters and 35 laborers is kept busy re-erecting them. In addition to the trucks and trailers used for transportation, two crawler type cranes do the dismantling while three cranes reassemble the houses at the new site. Portable power saws are used for most of the cutting, but are supplemented by hand sawing wherever necessary.

Site preparation includes the complete installation of electric, sewer, water and gas lines; leveling the site and landscaping it; construction of macadam street paving, concrete curb and gutters, and concrete sidewalks; and the building of necessary playgrounds and parking lots.

The completed houses will be equipped with new gas ranges and ice refrigerators furnished by the government. Two interior and one exterior coats of paint will be applied to all the houses upon re-erection.

Contractors on the job

James Lonie is general superintendent of construction for the Bush Construction Company, New York, prime contractors for dismantling, moving and re-assembling the 109 FPHA houses. Wm. A. Clemenger is assistant superintendent in charge of dismantling and Michael Lynch is assistant superintendent in charge of re-erection. A sub-contract for transporting the houses is held by the Trailer Transport Co., Flint, Mich.

Preparation of the new site is being done under contract by A. W. Kutsche and Company, Detroit, Mich. H. Wilson is superintendent of construction on this work.

The entire project is under the supervision of Hugo C. Schwartz, acting director, and J. H. Gaylord, assistant director for development, Region VIII of the Federal Public Housing Authority, Cleveland, Ohio. J. J. Mette is project engineer in charge of the field work.

Fig. 1. Equipment stored a repair depot awaiti reconditioning operation

Heavy Equipment Repair at Advanced Base

N. A. Bowers
Pacific Coast Editor, Engineering News-Record

***Contents in Brief**—Reconditioning and rebuilding of heavy construction machinery, trucks, amphibious craft and automotive equipment of many kinds is done by repair depots at advanced bases in the Pacific where the location is too remote to get any help from the mainland. Excessive maintenance requirements result from salt water exposure and frequently from emergency conditions under which equipment must operate.*

MEN OF LONG EXPERIENCE heading squads in every department is the secret of the success achieved by heavy construction equipment repair depots at advanced naval bases in the Pacific. Such depots would be of great importance in any major construction project; in the operations carried on by naval construction battalions supporting the rapid move across the Pacific they have been a major factor. Special importance attaches to these repair depots in the far distant locations because of the prohibitive time lapse involved in any replacements that have to come from the mainland.

Progress of the war depends on construction work promptly done at advanced bases. Overloads, emergency conditions and unfavorable climate are continually wearing out or breaking down the equipment. Factory service or replacements are not possible and the only answer is repair depots that can do far more than would ever be classified under the heading "repairs" at home. Such depots at the front frequently und take jobs that are in the class o dinarily requiring that the equipm be sent back to the maker.

A typical depot

One of these depots in the So Pacific was selected as typical for pu poses of this article and the follow data were recorded in a trip thro the plant with the officer in charg Lieut.-Comdr. W. E. Guest, USN who, in peace times, operates his o machine tool plant in Chicago. Un him at this base was a group of ab 750 workers, including 18 comm sioned officers and 27 CPOs. Th crew works in a plant area of abo 20 acres which is none too much roo for storing and moving equipme that arrives in a continual stream an moves through the plant in the ord of importance and urgency of nee

Crew, machine shop equipment and supplies were selected with a view to repairing 100 pieces of heavy construction equipment and 100 trucks per month. Three times that amount of work was being done in both of these departments when Lieutenant-Commander Guest was interviewed. Proof of the value attached to this work and the high quality of mechanical talent involved lies in the extent to which other branches of our forces have been bringing emergency or specially difficult jobs to this particular depot.

The machine tools provided, fortunately, are of the best. Evidence of foresight as to the difficult problems that would be faced appears in the excellent quality of the plant equipment that was shipped out from the states.

Beginning with the layout of the area as a whole and the shop buildings themselves (which of course this detachment was obliged to construct with its own forces), the ability and experience of the workers were evident from the start. The buildings, principally of the large size Quonset hut type, were spaced with ample room for movement of the large equipment units between and around them. Machine tool installations in each shop are arranged for accessibility and are provided with every requirement in the line of electric service, compressed air, gas torches for heating metals and small power-driven tools of ever kind. All parts of each shop are lighted for 24-hr. service which is the usual operating schedule because of the overload that the depot has carried from the outset.

Rebuild as well as repair

Much of the work in such a plant is quite the same as the routine in machine shops at home. However, because of the remote location out in the Pacific many things are undertaken which ordinarily are not in the "repair" class. For example, the realignment of a heavy truck chassis which becomes necessary after enemy bombs or a bad wreck have twisted it out of serviceable shape. In such a case, if some member of the chassis frame is crumpled beyond reclaim, it is cut out with a torch and a substitute member is provided from scrap. Members only slightly twisted are heated and jacked or hammered back into shape prior to a reassembly where, with further aid of heat, jacks, braces and other devices the restored chassis is once more trued up to an alignment so exact that engine and drive shaft are precisely in line and the unit can be sent out "good as new."

Conditions in the humid tropics

Some of the conditions encountered that are important factors in maintenance are high humidity, the frequent exposure to salt water with resultant corrosion and the fine coral dust that shortens the life of motors. Endeavor is made to salvage and repair every machine, unit or piece that might be useful later. Thus there is an unending amount of work awaiting time and attention. This constitutes a reservoir of equipment, spare parts and valuable "scrap" that oft-times makes the difference between permanent loss of a damaged unit and its return reconditioned, to regular service. An example of this (Fig. 3) is the adaptation of a heavy-duty gasoline engine to a large pump by interposing a flywheel and adding a special radiator unit. A special bell housing was built, the pump case was drilled to accept the new driving unit and the original motor mounting was extended to permit the addition of an extra large radiator for more effective cooling. The tappets were set at 0.015

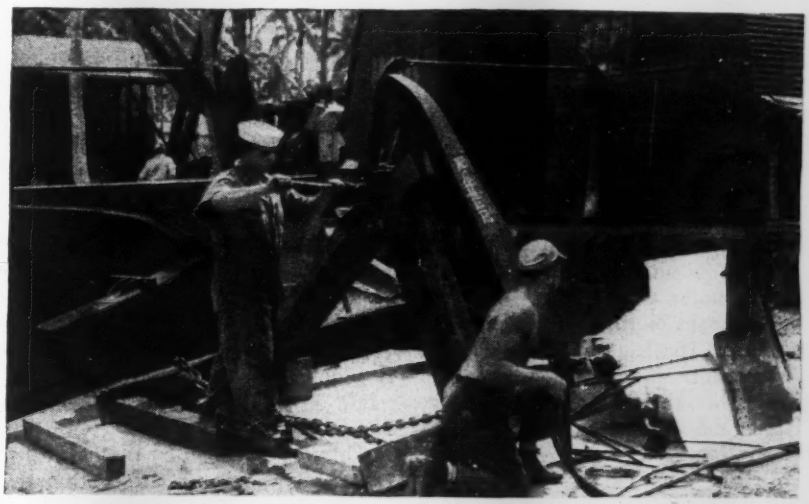


Fig. 2. An oil torch heats a bulldozer blade as a ratchet jack applies strain to give desired shaping while metal is hot.

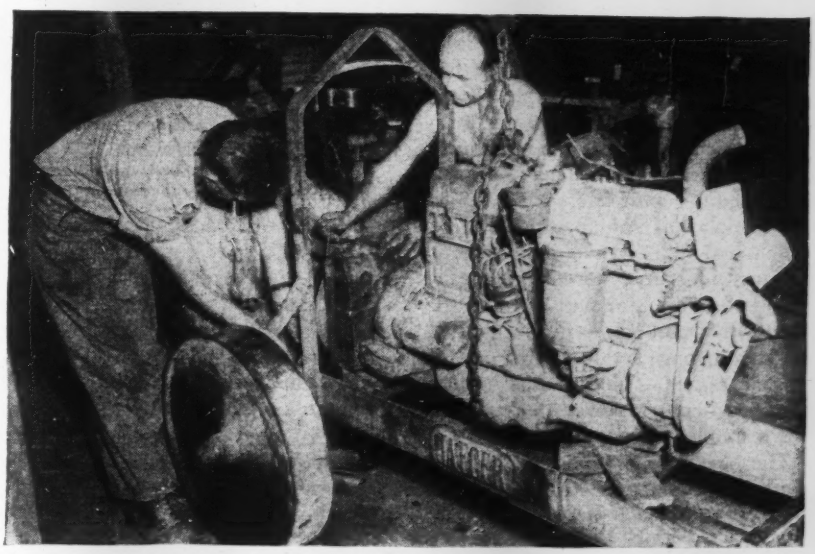


Fig. 3. On one end this gasoline engine is being fitted to a flywheel that is part of a pump, at the other end a lengthened frame will permit adding a special radiator.

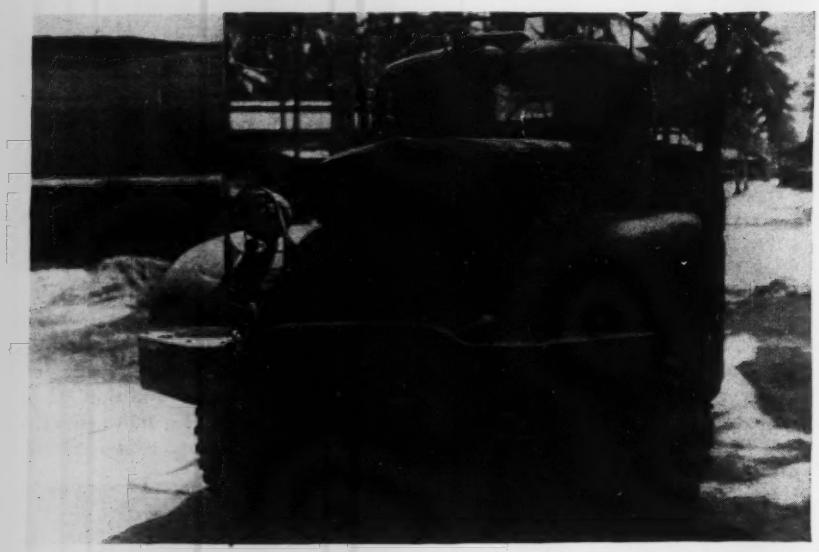


Fig. 4. This truck is ready for service again after front end was completely wrecked, engine pushed back through front seat and driver killed.

and checked frequently because of the excessive heat in constant operation. The point is that the necessary pumping service was supplied from available equipment.

The motor truck shown in Fig. 4 was brought to the depot completely wrecked. The front axle was broken, the radiator smashed and the engine pushed into the driver's compartment, killing the driver. As shown in the illustration, the truck is again ready for work; it left the repair depot with the same service expectancy it had when it first reached the island.

Analysis of one month's work

An analysis of the jobs done in a single month at this plant showed that 20 percent of the work completed was major in character, involving complete vehicle overhaul. The remainder consisted of replacements, adjustments, body repair and such items as the supply of innumerable parts, which had to be made in the shops because no spares were available.

Although a major part of the work during the month was in the field of truck and construction equipment repair, it is notable that a wide variety of other items were on the records. For example:

The electric shop repaired and reconditioned fourteen electric generators. The electric battery department rehabilitated great numbers of batteries and battery parts. No extra storage batteries were shipped out with this detachment and none have been received subsequently. Hence the depot issued a request to branches of Army, Marine, Air and Navy units in the area to send in all used batteries and parts. This enabled the depot, within a period of three months, to turn out more than 2,100 storage batteries which were made available from material sent in because it was in "out-of-service" or scrap classifications.

This repair depot, by reason of the shortage of parts that are continually in demand, manufactures large quantities of standard spare parts that are put in stock because they are sure to be required in the future.

A special detail from this depot went aboard a ship and reground a crankshaft, 11 ft. long, for a diesel auxiliary engine. Other crankshafts were reground in the shops.

Make almost anything

Indicative of demands of the less important type, when the mess officer reported a shortage of drinking glasses, one of the men in the shop devised a method of placing a hot wire around the upper part of beer bottles to break off the tops uniformly. Then the rough edges were ground down on the equipment provided for grinding windshield glass. By this expedient glass tumblers were turned out at the rate of 20 per man-hour.

Typical of expert skill employed is the extensive use of the equipment for spraying molten metal on machine parts that require to be built up. Even before the detachment left the United States this equipment was expected to have many uses and operators went to the Los Angeles plant of the manufacturer, the Metallizing Co. of America, Inc., to get expert instruction in operating the metal spray guns. As an example, these guns were used for building up a large diesel piston where additional metal has to be put on and then machined. With this equipment it was possible to add the necessary metal without heating the piston itself beyond 180 deg. F. The necessity for keeping the temperature down in this case was because of the zinc facing used to insure smooth operation of the piston.

Experts analyze trouble

Perhaps greatest appreciation of services rendered by this depot comes from branches of the military forces using high-speed motor equipment. These engines have the reputation of being more "temperamental" than the heavy-duty type. Two typical instances follow:

(1) A sea alligator (seagoing truck that costs about $35,000) had developed trouble in a bilge pump so serious as to keep the unit out of service much of the time. When the unit came to this depot for attention the bilge pump would throw only a 6-ft. stream. Mechanics analyzed the trouble, put in larger bearings and got the pump to throw an 18-ft. stream. In service again the unit worked continuously.

(2) In another case a fleet of fast speedy craft, each worth about $50,000, were all laid up with mechanical troubles. None had been able to operate more than 5 hr. without coming in for repairs. Maintenance requirements were such that the fleet was practically out of commission.

When one of the units came to the repair depot for analysis it was found that a change costing only about $200 could correct the trouble.

Commander Guest's motor experts were given the job of working over the entire fleet. They put an oil groove in the main bearings, added another lubricating oil pump, stepped up the pressure on the lubricating oil and added a few professional touches here and there. The result was that as this was written units of the fleet had been in service an average of about 300 hr. and were still going strong with no time out for repair.

SPECIAL SECTION ON

Water Supply Achievements

An enviable record has been compiled in building and maintaining water supply facilities to meet war demands. Equally satisfying is the promised performance for the postwar years, as measured by the yardstick of projects proposed and planned. This, in brief, epitomizes the status of the waterworks field today.

Versatile and ingenious applications of engineering principles have characterized the manner in which water supplies have been improved and maintained under the difficult conditions imposed by war. Some recent examples of what has been done by American engineers at home and abroad are incorporated in this special section.

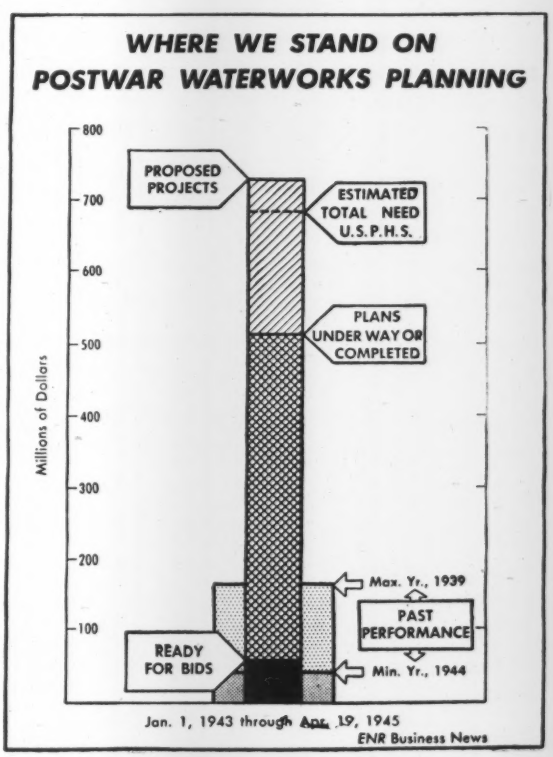
Wide geographic distribution is represented by the articles in this section. But the primary basis for their selection rested on their contribution to new thinking in the solution of problems that are common to many phases of waterworks design, construction and operation. For example, the basic data gathered at St. Paul on sand incrustation may be usefully applied wherever filtration is employed. Likewise, the experiences at San Francisco with prestressing steel on concrete tanks are of fundamental importance to every constructor. And the manner of extending supply facilities at Corpus Christi provides vital ideas for all designers and consultants. These examples typify the content and intent of the articles in the following pages.

Looking ahead, one cannot escape the conviction that special efforts will be required to cope with an unprecedented volume of new waterworks construction. As evidenced by the accompanying chart, some $733 million of proposed projects have been compiled from *Engineering News-Record* reports, and of this total 69 percent — or $508 million — represent plans underway or completed.

This is a tremendous backlog. Exactly how big can best be illustrated by comparison with an inventory of actual needs as determined by the U.S. Public Health Service. The U.S.P.H.S. reached the conclusion that an expenditure of $683 million will be required to meet postwar needs. On the basis of *ENR* April reports, the proposed projects already exceed this anticipated goal by 7 percent; furthermore, work already on the drafting boards totals 69 percent of the estimated needs of the nation.

Waterworks men have reason to take pride in their accomplishments. Their record in war is well-documented. And they are now well advanced in drawing their plans for the years of peace and for greater public service opportunities.

WHERE WE STAND ON POSTWAR WATERWORKS PLANNING



Prestressing Bands on a Concrete Tank

John J. Crowley
Assistant Engineer, San Francisco Water Dept.

***Contents in Brief**—In building a 300,000-gal. prestressed water tank, well-known methods were used until the time came to get the right tension in the steel bands. On this point much had to be learned. The extensometer method was tried and abandoned; the shear wrench method succeeded but laboratory calibration of shear pins was necessary and it was found that refinement in stress control (within 10 percent) should not be expected.*

THIS IS AN ENDEAVOR to record what was learned in finding ways and means of putting the desired amount of prestress in the steel bands around a 300,000-gal. water tank in San Francisco. Other parts of the work such as building forms, pouring concrete floor slab and side walls and even making the important watertight joint between walls and floors, have previously been described repeatedly and on these points there were ample records of proper procedure. The prestressing of circumferential bands, however, was a different matter. No published information on this phase of the work was found adequate and complete enough as a guide after which to pattern the work in the field.

If another tank had to be built by this same organization, the prestressed method could be used much more speedily and effectively and without the need for exploring and preliminary testing described in the following.

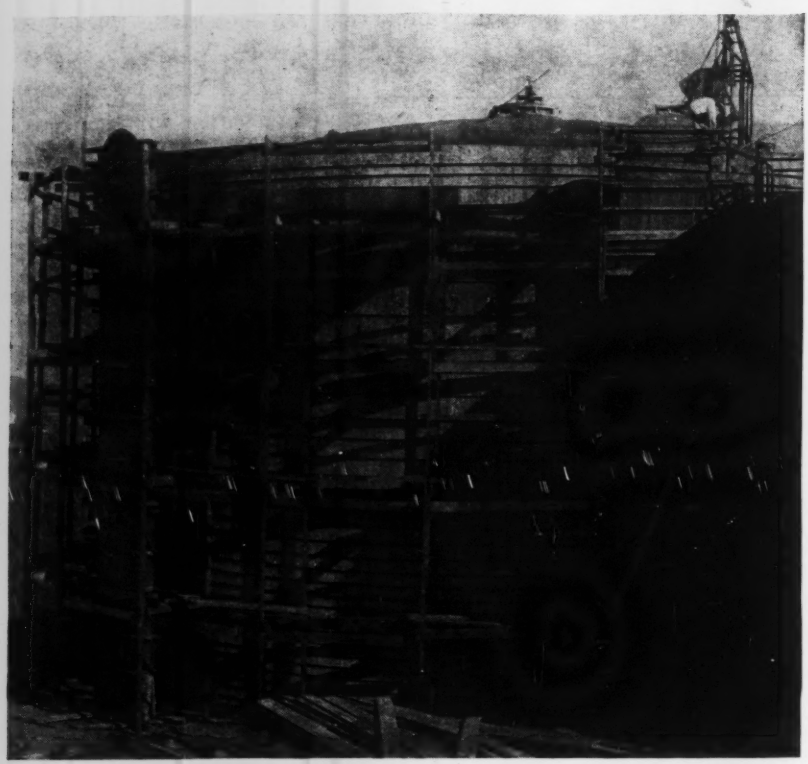


Fig. 1. The Forest Hill tank under construction showing ¾-in. square prestressed bands in place. The tank is 45 ft. in diameter and 25 ft. high.

In August, 1943, contract was awarded for the construction of a concrete tank on Forest Hill where the need was for additional storage of 300,000 gal. The type of structure selected was a prestressed concrete tank 45 ft. in diameter, 25 ft. high and with side walls having a thickness of 8 in. The system of prestressing specified was circumferential bands of ¾-in. square bars upset at both ends to 1¼-in. diameter and threaded for a 5-in. length. Steel with a yield point of 55,000 lb. per sq. in. was specified.

The design called for each steel hoop to be made up of three bar lengths. Instead of the conventional turnbuckles for tightening, plans called for the use of vertical, made-up box beams through which ends of the bars were passed and against the sides of which a nut and washer on the bar end could bear. With this arrangement three of these vertical beams were required and each bar could be tightened at both ends.

For the most part pouring of concrete floor and wall sections was a routine job much the same as for any concrete structure. Forms were set up for one quadrant of the walls at a time. The first two quadrants were erected opposite one another and then the other two closing pours could be made in the open spaces between.

The job as a whole naturally divided itself into four parts: (1) preparing the foundation, laying the floor slab and pouring the side wall or shell; (2) placing and prestressing the circumferential bars; (3) pouring the concrete dome roof; and (4) the architectural finish of the structure.

The tank shell

The tank wall, as originally designed, was to have a minimum thickness of 6 in. near the dome with increases in thickness at two points making the base of the wall 8 in. thick

As a practical matter, in construction it was found simpler to make the wall uniformly 8 in. thick for the full height. The reinforcing in this 8-in. wall consisted of $\frac{5}{8}$-in. vertical bars 12 in. apart with $\frac{1}{2}$-in. horizontal bars on 18-in. centers.

Around the outside of this reinforced wall the $\frac{3}{4}$-in. circumferential steel rods or bands were placed, beginning with a 5-in. vertical spacing at the bottom and increasing the spacing to 2 ft. 5 in. near the dome. Then came a layer of 4x4-in., thirteen-gage welded wire fabric, over the bands, to strengthen the shotcrete, of which a 2-in. thickness was put on after the bands had been stressed. The wire fabric was fastened to the bands by sixteen-gage ties 2 ft. apart both ways, placed under the bands before prestressing. This 2-in. shotcrete coating was to cover and protect the $\frac{3}{4}$-in. bars as well as to provide a final exterior finish for the tank.

Use of the extensometer

Specifications called for the bars to be stressed first to a tension of 16,000 lb. per sq. in. This is where they were to remain until the dome roof was poured and had time to set. Then the bars were to be brought up to final tension of 31,500 lb. per sq. in.

Preparatory to the first prestressing, punch marks 8 in. apart were made at various locations around the hoops to serve as points in which to set an extensometer for measuring stress. The extensometer was applied by hand in the field to obtain readings on the bars before they were subjected to any tension. A second application, however, showed that there was a wide variation in readings even before the bars carried any tension. The method of reading the extensometer in the field at intervals had to be abandoned because of the erratic results. Failure of this experiment was attributed to moisture, dust and rust particles in the punch marks, accumulating between the readings, as well as the difficulty in applying the instrument by hand to the shallow markings made with punches.

Shear pin studies

A switch was then made to the plan of tightening the bars with a shear wrench. By this method the nuts on the ends of the bands are tightened until the strain applied to the wrench handle shears a pin of predetermined strength. As a preliminary to this test bars, nuts and washers of the same size as used on the tank were set up in a testing machine. From repeated experiments using various materials as shear pins in the wrench, it was found that for the 16,000-lb. tension a $\frac{1}{1\frac{1}{8}}$-in. bronze Oxweld brazing rod would be suitable; for the 31,500-lb. tension a $\frac{1}{1\frac{1}{8}}$-in. steel Oxweld welding rod was employed.

A series of 28 tests run as a check on the steel rods gave the following strengths in pounds per square inch in the bars as measured in a testing machine: minimum 29,900; maximum 36,500; and average 32,900. These are, respectively, 95, 117 and 105 percent of the specified stress.

During these tests it was found necessary to observe certain procedures and precautions in order to obtain uniform results, namely, all nuts and washers were coated with flake graphite mixed with 30 SAE oil; all nuts were tightened till the shear pins broke under a slow, steady strain; and all pins that broke under a jerky strain or at the start of a new stroke of the wrench were released one-eighth turn before repeating the tightening operation with a new pin.

Extensometers in the laboratory

When it became apparent that the shear wrench method would be satisfactory, a second group of laboratory experiments was undertaken with an extensometer to secure, if possible, a check on the shear wrench method and also to determine the stress in the middle of the bar. This latter plan would show whether stress at the ends was being carried uniformly throughout the bar length.

This second series of experiments confirmed conclusions formed after the early field tests with the extensometer, namely, punch holes are too shallow and the bevel of the mark is too broad to allow exact centering on repeated trials. Even laboratory readings so made were erratic and could not be duplicated. However, this difficulty was overcome by using drill holes in place of punch marks. When holes $\frac{1}{1\frac{1}{8}}$ in. in diameter were drilled $\frac{1}{8}$ in. deep and 8 in. apart, accurate duplication of extensometer readings were obtained under a condition of no strain. Sand and dust rubbed into the drilled holes did not cause discrepancy in the readings.

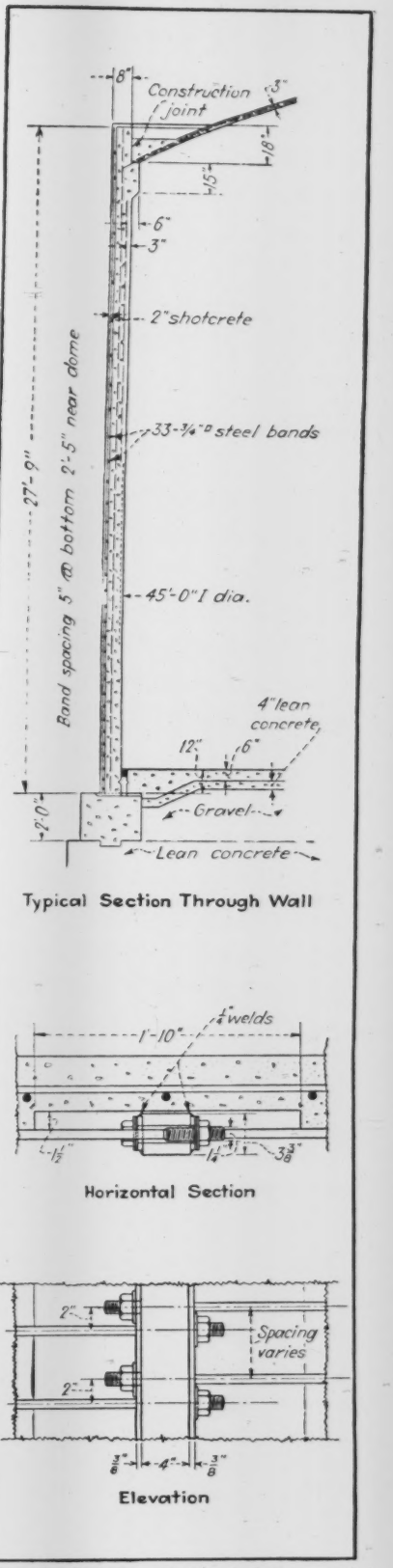


Fig. 2. Details of band joints and a vertical section through the wall of the prestressed concrete tank.

Under a condition of strain the extensometer readings made on the drill holes were in most cases quite accurate but a sufficient number were so far off the corresponding stress recorded in the testing machine that serious doubt was cast on the reliability of such readings. The cause for erratic results was ascribed to misalignment or distortion in the bars under test.

This cause is serious because if it affected results in the short length of the bar involved in the test, it would naturally be much greater in the full length of bars on the tank. Since the bars lie in a circular curve, bending around the tank more closely as they are tightened, irregularities in the concrete surface will cause realignments throughout their length. There is, also, the distortion caused by the tendency of the bars to twist as they are tightened.

Other lab and field tests

In order to test this theory about misalignment and distortion as well as to check the laboratory tests with the extensometer, a second method was devised in an attempt to measure the elongation of the bars by other means. This made use of small clips of the cross-sectional shape of channels. They were fitted 18 in. apart over the bars in the laboratory and were tightly clamped to them by means of set screws. The bars in these clips were not tested under strain but readings under no-strain were taken and the bars were hammered to duplicate the hammering of the bars in the field, as required by the specifications, during the process of tightening. Duplicate readings were taken before and after the hammering under conditions of no strain. Since all these readings checked it was apparent that any discrepancy that might appear on the tank could not be attributed to slippage or turning of the channel fastenings caused by the hammering.

After this laboratory experiment a return to the field was made and further tests were carried out on the tank itself. The bars on the tank were tightened with the shear wrenches using the $\frac{1}{8}$-in. bronze and steel pins. All precautions, as mentioned in the foregoing, were observed and the bars were hammered as they were tightened.

Both the extensometer and the clips were used to measure the elongation of the bars and, as was to be expected from the laboratory tests, gave erratic readings. The clips in particular gave readings that were far out of line, some even giving negative values after full tension had been applied. The fact that the clips had been set 18 in. apart as against a spacing of 8 in. for the drill holes made for the extensometer, may account for the wider discrepancies in the clip readings. In both cases, however, it may safely be assumed that the readings are greatly affected by the misalignment introduced into the bars in the process of tightening.

Prestressing within 10 percent

While nothing conclusive can be read into the readings taken as described with the extensometer, a study of them leads to some general conclusions which may be corroborated by observation and reasoning.

First, a repetition of the tightening operations on any bar, after adjacent bars have been taken to full tension by the shear wrench, tends to raise the stress in the bar. Thus it was observed that a bar once tightened, then released one-eighth turn and retightened with the shear wrench (after adjacent bars on both sides had been tightened) required considerably more than one-eighth turn to break the shear pin the second time.

If obviously erroneous readings are thrown out and if the readings remaining are averaged, the extensometer results reflect this tendency very clearly, showing an increase in tensile stress of about 8 percent.

Again if readings of wide variance are omitted and if the remaining readings are averaged, two other interesting tendencies are evident. First the average of all such readings is below the stress specified, averaging only about 92 percent of the 31,500 psi. Second, the stress in the center of the bar averages about 97 percent of the stress at the ends, thus confirming the belief that some stress is lost through friction.

These experiments and general conclusions were sufficiently conclusive to convince engineers of the water department that the tank might safely be prestressed by means of the shear wrench. The procedure adopted for the final stress was as outlined in the foregoing and all nuts were first released, then retightened a second time.

The San Francisco Water Department operates under the general direction of N. A. Eckart, general manager and chief engineer. George W. Pracy is superintendent. The contract for construction of the Forest Hill tank was carried out by De Luca and Son at a contract price of $20,629.50.

Scale Prevention On Idle Valves

Calcium carbonate scale that accumulates on the movable parts of valves and other reservoir outlet works operated only infrequently may grow to such thickness as to cause the parts to freeze, after which they cannot be operated until they are dismantled and mechanically cleaned. In municipal or industrial water distribution systems where soda-lime treatment is used it sometimes happens that a serious amount of "after-precipitation" or delayed-action deposition occurs, particularly in the dead ends at idle valves.

These troublesome deposits can be prevented, the Bureau of Reclamation believes, by the use of a chemical, sodium hexametaphosphate. A charge of this is injected into the gate system each time the gate is closed and so long as water in contact with movable parts of the gate contains as much as 5 ppm. of the chemical, scale does not form. There is said to be no danger of corrosion from the presence of the chemical in quantities less than 500 ppm. Where valves are to be closed for long periods it is proposed that a small continuous injection be fed in to compensate for water lost by leakage. The cost of such operation would be low as the chemical costs only 25 cents per pound.

The Department of the Interior's "Award of Excellence" has been conferred upon John L. Gilliland, Jr., an engineer of the Bureau of Reclamation, Denver, for suggesting this idea which has been tried out and found to be effective. Use of the new idea, which has been adopted by the Bureau of Reclamation, will, it is announced, "obviate the necessity of maintaining a full-time servicing crew to keep outlet gates in working order and will result in a saving of about $5,000 a year on each project in which it is used."

Increased Span Length on Large Pipe Obtained by Ring-Girder Suspension

Burton S. Grant
Engineer, Los Angeles Aqueduct

***Contents in Brief**—Floods showed old piers to be unreliable and that the pipe could stand longer spans. Hence ring-girder supports were put around the 10-ft. pipe and spans were increased from 24 to 70 ft. Welding played an essential part in this reconstruction of Los Angeles aqueduct siphons built a third of a century ago.*

TWO INVERTED steel siphons 10 ft. in diameter on the Los Angeles-Owens River aqueduct have been provided with new and better supports, thus reflecting what has been learned about the maintenances needs of these siphons as well as progress in methods of construction during the third of a century since they were built.

The critical points on the aqueduct are Soledad and Deadman Washes, in adjoining canyons, where floods have repeatedly menaced the concrete piers, built on 24-ft. centers, which carry the pipe. Fortunately, the ½-in. plate thickness, made necessary by the head on these siphons, has given the pipe a stiffness that enabled it to safely span much more than the distance between the piers originally put in. The adequate factor of safety thus provided and the quality of the riveted joints was demonstrated when, a year ago, four adjoining piers were carried out by a flood, leaving the pipe unsupported over a 115-ft. span, about five times the intended length of span. Under this excessive span deflection was only 3½ in.

Following this serious destruction of supports it was decided to immediately construct deeper piers across the entire flood plain of Soledad and Deadman Washes. The way the pipe had stood despite the loss of four piers proved that the span could be increased, thereby reducing the cost and the need for critical materials. The program decided upon was to eliminate two-thirds of the existing piers and by replacing every third pier, make the new span 70 ft. instead of the old 24. This plan was found to meet all design requirements if a ring-girder type of support was used to provide the necessary stiffening so that the pipe, when empty, would retain its shape and form a circular beam to prevent collapse over the longer span.

Ring-girder design

The principle of ring girders supporting circular pipe sections was used first in Sweden and a complete analysis was developed and published in this country by Herman Schorer. Design of the new Los Angeles aqueduct siphon supports was based on the Schorer data, using a working stress of 18,000 lb. per sq. in. The ring-girder section was developed

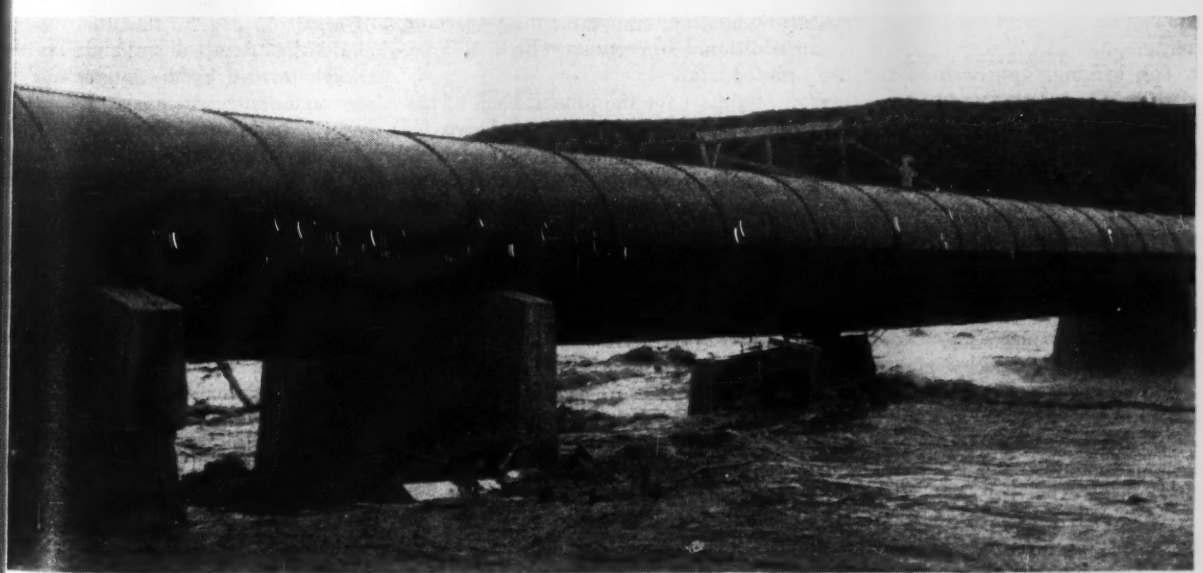
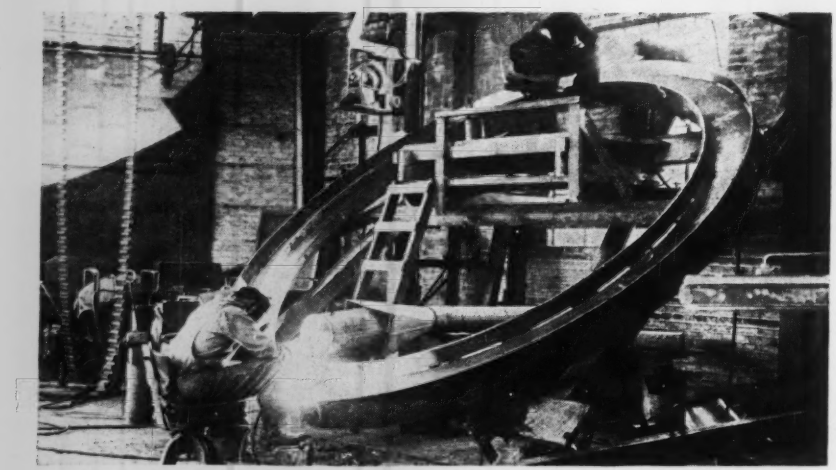


Fig. 1. The flood carried out four piers from under this 10-ft. siphon pipe. The sag in a 115-ft. span was only 3½ in.



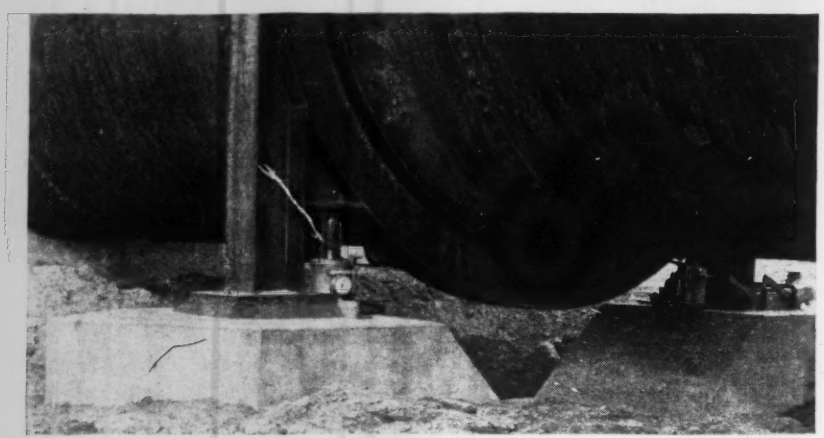


Fig. 2. A jig on a 45-deg. angle (above) was used for assembling ring girders, permitting a maximum amount of downhand welding. Below: Ring girders installed on the new 70-ft. spans; the latter are three times original span length.

with two flanges and a web with dimensions and plate thicknesses as shown on the accompanying drawing.

The original approach to the use of the ring girders was to fit the ring girder to the existing contour of the pipe which had an average horizontal diameter greater than the vertical diameter, due probably to some permanent deformation produced when the pipe was originally filled.

A template was made at the point where the first ring was to be applied. When this template was taken into the shop and the detailed plan of fabrication was worked out, it was found that a great deal of shop work would be involved in fitting the rings to this irregular pattern. Accordingly, it was decided to fabricate circular rings, cut them in half and then by means of tighting bolts to bring the two halves together, bringing the pipe to a true circle in this process. This method was very satisfactory and in every case a perfect fit was obtained after performing certain additional operations which will be noted later.

Support for the pipe at each of the new ring girders consists of two H-beam legs with web reinforcement between the ring and the legs to strengthen the frame against horizontal thrust as from earthquakes. After allowing for maximum settlement of the new concrete piers, during which the pipe was temporarily supported at the rings by means of timber blocking and wedges, the pipe was lowered or raised to the proper grade and grout applied between the ring-girder bearing plates and the concrete of the pier. The flanges were specially designed for use as jack bearings to facilitate raising off temporary blocks and lowering to the pier itself.

Pressure cells were used to obtain equal loading on the piers to avoid stress transposition by reason of unequal settlement. After allowing at least one year for the new piers with siphon load superimposed to attain a maximum settlement, the pressure cells are to be again used to compensate for any unequal loading there may be at that time.

A total of 59 ring girders were installed on the two pipes. Both of the lines so equipped lie on tangents, necessitating anchor blocks at the end of each tangent to restrain the pipe from movement that otherwise might be caused by temperature changes. Eventually it is planned to weld all joints on these siphons over the length now supported on ring girders. This will include both longitudinal and circumferential joints and will involve about 2,600 lin. ft. of the Soledad siphon and 1,450 lin. ft. of Deadman siphon.

Attention is now being given to the use of a modified ring-girder suspension for the thinner pipe in these siphons. This is because considerable movement caused by "breathing" is common in plates of $\frac{1}{4}$ and even $\frac{3}{8}$-in. thickness. This repetitive movement not only causes excessive wear at points where the pipe rests on the old style piers, but causes riveted joints to remain open with resultant sweating and corrosion.

Assembling the ring girders

A timber jig was built in the shop on which the girders could be supported, during assembly, at an angle of about 45 deg. so that the welding could be done downhand in the trough formed by the intersection of web and flange members. This timber jig was provided with three sets of rollers, one of which was made live by means of a chain drive from a small motor-driven worm gear speed reducer.

The web sections were made up of six segments, which were cut by means of a motor-driven compass torch and welded together with V-welds on a surface plate to form a complete circle. As the segments were cut from the same plate, the radius of the inner curve on each segment was the same as the outer radius of the preceding segment and these inner edges were left untrimmed until the outer flange had been tack-welded to the web section. After this had been done, the par-

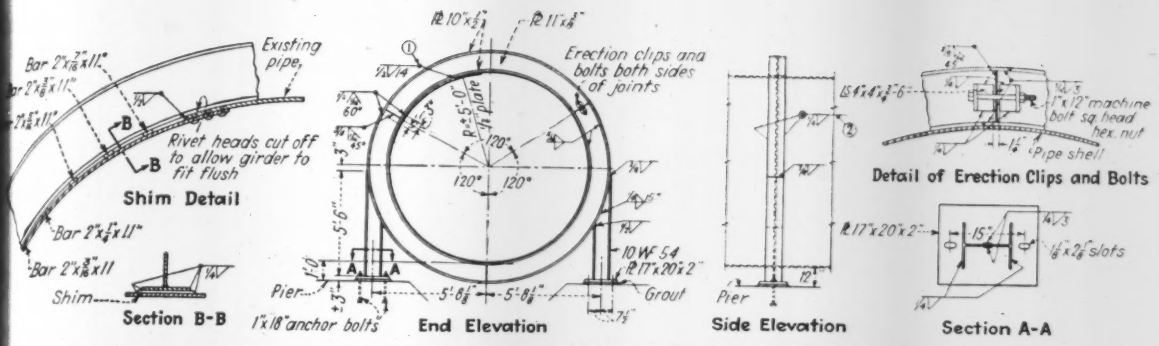


Fig. 3. Dimensions and details of welded ring girder and its field connections to existing pipe line.

ly completed girder was set up on surface plate and the inner edge the web was cut to a true circle means of the compass torch. The inner flange was rolled up as complete circle and butt-welded h a double V-weld, the diameter ng made slightly larger than the mpass torch cut at the inner edge the web. The web was then heated expand it sufficiently so that the er flange would drop into place, r which it, also, was tack-welded.

Special jig for welding

The girder was then placed in the ition jig and two welders work- together proceeded with the weld- using a coated rod made speci- for downhand, single-pass weld- In this work alternating 1-ft. ps of single-pass, $\frac{5}{16}$-in. weld were on the inner and outer flange- joints with the ring rotated by motor drive at a speed of 8 in. min. After the ring had made a plete circle, the intervening es were welded in the same man- The ring was then turned over the jig and the same procedure followed on the other side. It was found that the flanges were orted somewhat by the shrinkage the welds and it was necessary bend back the inner flange to a y cylindrical shape by means of a king clamp, after which the rings e cut in two on the vertical di- eter. The rings were made about in. smaller in internal circumfer- e than the taped circumferance of pipe, with an additional allow- e for about ¼ in. of circumferen- shrinkage during the welding cess.

Ring girder installation

Seams on the siphon pipe were lap- and triple-riveted with ⅞-in., cone-head rivets, not countersunk. It was therefore necessary to remove the rivet heads to make a fit between the ring girder and the pipe. The first move in this operation was to run a heavy bead along the edge of the plate to seal the seam against leakage in the portion where rivets had to be cut. Several schemes were tried for removing the rivet heads, and a considerable amount of difficulty was met at first in stopping leaks.

After several trials the best program was found to be the following: The rivet was burned away to a depth of about ¼ in. below the surface of the plate. Before the rivet had time to cool, welding was commenced, using a bare electrode and fairly heavy current. The welding was continued until the recess was completely filled and weld metal was flush with the plate surface. Any excess metal was removed with the portable electric grinder. This required rapid work, but the operator soon became dexterous in performing it.

Allowance made for shims

In measuring the circumference of the pipe with a steel tape, a series of wooden shims of decreasing thickness and attached to a jig was inserted under the tape next to the seam lap so that proper allowance would be made for metal shims of the same thicknesses to be inserted at the same points under the girder when it was placed. Horizontal diameters of the pipe were found to be about 1½ in. greater than the vertical diameter at the point where it rested on the old style piers. Because of this it was necessary to exert force in bringing togther the two halves of the ring girder in order to bring the pipe to a true circle and to take up the slight allowance of under-diameter in the girder. This was done by means of the two pairs of 1¼-in. bolts with N. F. (national fine) threads and extra deep nuts which were inserted in gusseted lugs temporarily welded on either side of the ring at each joint. These bolts were made up tight with a heavy wrench. It was found, however, that at some points the pipe plate did not come out to the girder. This was remedied by welding ¾-in. studs to the pipe at necessary points and pulling the plate out to the girder by means of a strongback and nuts.

The rings were welded to the pipe with $\frac{5}{16}$x3-in. welds on 6-in. centers in the space 45 deg. on either side of the horizontal diameter, the balance being welded with the same welds on 12-in. centers. A $\frac{3}{16}$-in. sealing bead was then run in all intervening spaces. After the rings were welded to the pipe, the legs and foot plates were trimmed to fit the contour of the rings and welded in place in the field.

Town Makes Subdividers Pay Utility Costs

York Township in Ontario is the first in Canada to insist that new subdivision owners should pay the entire cost of the installation of waterworks and sewage systems, with the result that it is included in the initial cost of a lot or a new house, and the purchaser does not find it added to his tax bill for a number of years. This system also protects the township, in the event that a subdivision fails after the installation of utilities at public expense.

The scheme was originated by a former township engineer, Grant Jack, now city engineer of St. Johns, Newfoundland.

Fig. 1. Typical of emergency expansion of Corpus Christi waterworks is this extra raw water pump on the river ba

Seven Years of Emergency Expansion Meets Corpus Christi Water Demand

***Contents in Brief**—At a cost of nearly 3½ million dollars, the city of Corpus Christi, Texas, has increased its water supply from 4 to 27 mgd. during the past seven years to meet an amazing population and industrial growth and to serve a nearby naval air training station. The expansion of the waterworks has been one emergency after another, and at times the demand has exceeded the capacity. It was a case of adding a supply line, then a filter, then a settling basin, then more and more pumps, with the system seldom in balance. At present the system balances only by operating the filters at 150 percent of capacity.*

IN SEVEN YEARS the population of Corpus Christi, Texas, has increased from 45,000 to 115,000, a gain of 253 percent, but during the same period the water demand rose from 4 to 27 mgd., an increase of 675 percent. A series of emergency expansions has met this tremendous rise in water demand, but as Ed Noyes, consultant on waterworks, expressed it: "We have just kept ahead of the hounds." Those "hounds" came pretty close in 1943, however, for water that summer had to be rationed during peak requirements.

Because of the constant pressure for more and more water, coupled with war-time restrictions, there was no opportunity to build a new waterworks system to meet the current or anticipated demands. The situation required working with what was available, expanding the existing system by building one, then another, additional supply line from the plant to the city, by adding one, then another filter, by adding two sedimentation basins, one at a time, and by squeezing in more and more pumps in the already crowded pumphouse, then installing more pumps and emergency lines around the plant outside the buildings.

The Federal Works Agency helped out with a new supply line in 1943, but insisted on limiting its capacity to meet the expected demand as of Jan. 1, 1944, now already exceeded. Despite all this expansion, the water situation is still precarious, for only by operating the pumps, sedimen tion basins and supply lines at percent of capacity and the filters 150 percent of capacity, can the rent demand of 27 mgd. be Plans are under way for a gre enlarged and improved system t ing 50 mgd. capacity.

City grows fast

Corpus Christi enjoyed a r growth prior to the war with the ing of several large industries, but big surge in population resulted i stepping up the industries to war tempo and the installation of the Corpus Christi Naval Air Trai Base and its six auxiliary stati all located within 10 miles of the and using municipal water. The mated present population of 115 does not include navy personnel a stations, but does include their f lies living within the city.

Studies by city authorities and local Chamber of Commerce indi that the present population is per nent, and that the city will enj normal growth after the war. The dustries will resume their peace activity with practically the s forces as required for war work.

naval air station promises to be a manent fixture. The U. S. Bureau Census has placed Corpus Christi the head of six cities that will hold ir wartime growth and continue to and.

When the naval base was started July, 1940, arrangements were de with the city for water supply the maximum anticipated rate of million gal. per month, or an av- ge of 2.4 mgd. The station was ened in 1941, and by July, 1942, ter requirements had exceeded the ginal maximum figure. In August, 4, the navy demand was 4.8 mgd., re than the entire city was using in 8. Navy requirements for 1945 e been set at an average of 151 llion gal. per month, or about 5.1 gd.

Nueces River source ample

In 1915 the city turned to the eces River, which enters Corpus risti Bay just north of town, for its pply. A diversion dam was built at cross roads station of Calallen, 16 les west of Corpus Christi, for the l purpose of maintaining a con- nt depth of water in the river at that nt, and to prevent contamination seawater at high tide. A 20-in. mp was set up on the right bank, d a 20-in. cast iron supply main s laid to the city. The Calallen nt, greatly expanded through the rs, still remains the sole source of pply. The original plant was de- ned for 2.5 mgd.

For 16 years the supply was simply n of river, which has a mean annual w of 778 cfs., with recorded mini- m and maximum annual flows of and 3,519 cfs. respectively. In 1930 orage reservoir project was started Mathis, 15 miles upstream from the nt to store 65,000 acre-ft. Con- ction of the combination earth and crete Mathis Dam (known then as Fruta Dam) was marred by a fail- of a concrete abutment and part he overflow section, but the dam completed later in 1931.

The river, which rises above alde, 300 miles to the west, has al- s furnished an ample supply, ugh another larger storage reser- r is being contemplated to make e future increased demands can met. Throughout the recent rapid ansion of the water works system, supply mains to the city, and not source of water, have been the lim- iting factor in the system, followed closely by lack of sufficient filters and settling basins.

Early expansion

From 1915 to Jan. 1, 1938, the water system was considerably improved by the addition of filters and settling basins, but the capacity was increased during that time only to 4 mgd. by installing booster pumps in the 20-in. supply line. In 1927 the first filter with a capacity of 4 mgd. was placed in operation, along with the necessary clear well. Another 2-mgd. capacity filter was added in 1935. Meantime, two 4-mgd. sedimentation basins were built in 1919-1920, and the original settling basin had been converted to a clear well. A 10-mgd. reservoir had also been built in the city along with two elevated storage tanks.

Early in 1938, at the start of the emergency expansion program, the system consisted of these facilities: pumping capacity of 4 mgd.; two 4 mgd. settling basins with a capacity of 10 mgd.; two filters totaling 6 mgd. capacity; one 4 mgd. supply line to the city; and 10.75 mg. reservoir storage and 6.5 mgd. pumping capacity within the city.

Emergency expansion

By early 1938 the average daily demand had risen to 4.2 mgd., taxing the capacity of the plant. That spring a second supply line to the city was installed, a 30-in. cast-iron main, with cement lining and laid with cement joints, capable of delivering 10.5 mgd. and costing $680,000. A new 8 mgd. filter was built for $100,000, raising the total to 14 mgd. The raw water and high-pressure pumping capacity was increased by 9 mgd. at a cost $13,600. These improvements raised the system capacity to 13 mgd., except for the settling basins, which could handle only 10 mgd.

As part of its contract to supply water to the new navy installations, the city in 1940 built an 11-mile main of 24 and 20-in. pipe to the main base, and three auxiliary 8-in. lines to outlying fields. These cost $668,800. The city built to the various field boundaries, and all distribution lines and services within the bases were part of the navy construction contract.

By 1942 the average daily demand had risen to 9.9 mgd., and the maximum to 12.9 mgd., the last exceeding the capacity of the settling basins. Therefore, during that year $122,100 was spent for a new 4.5-mg. basin, designed for secondary sedimentation, bringing the total settling capacity to 27.5 mgd. There was no room for the new basin alongside the old installation, so it was located on nearby higher ground, requiring an intermediate pumping plant. At the same time the main pumping plant was increased from 13 to 24 mgd. at a cost of $143,300.

There was no letup in the increasing demand for more water. In 1943 the

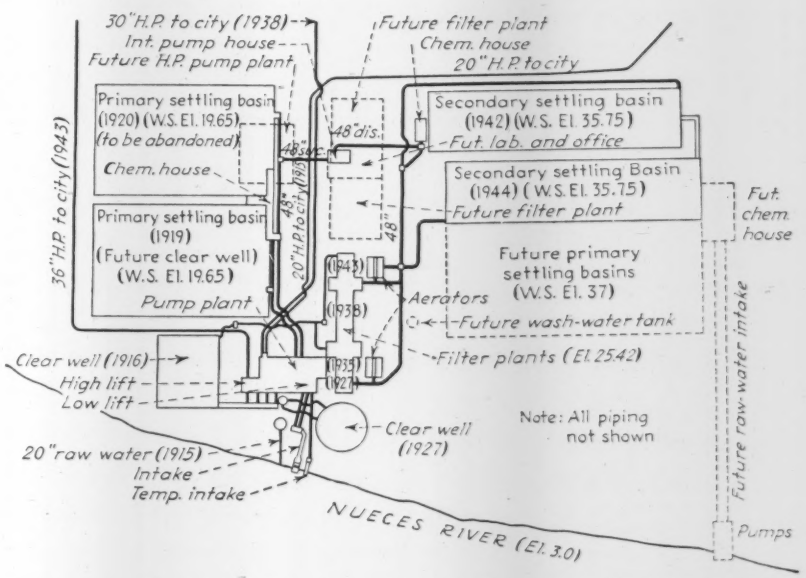


Fig. 2. Present and future facilities at the Calallen pumping and filtration plant.

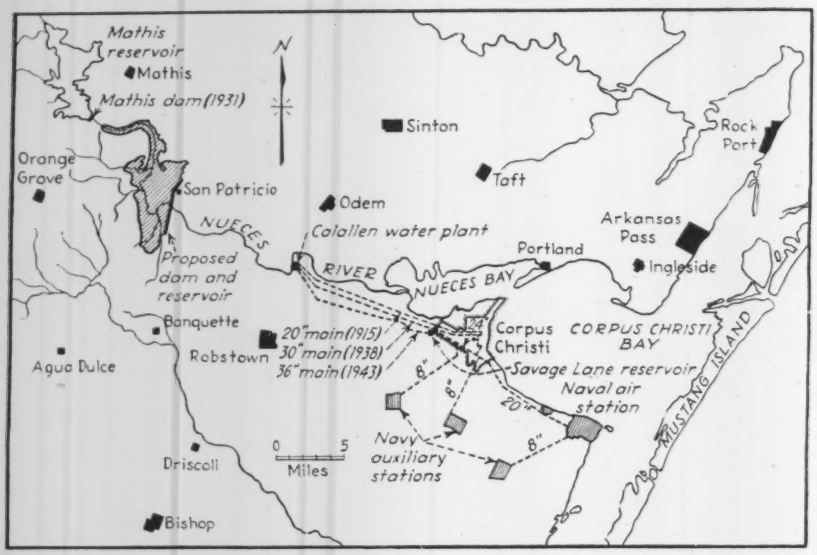


Fig. 3. Ever since 1915 the Nueces River has been the source of the Corpus Christi water supply. Revision and enlargement of the Calallen pumping and filtration plant, a new storage reesrvoir upstream, and a new supply main to the city will insure ample water for the future.

average daily demand had reached 11.5 mgd., dangerously close to the system capacity of 13 mgd. limited by the supply lines, and the maximum demand exceeded that capacity at times. The most pressing need was for another supply line to the city; next in importance was more filters.

To meet the requirement for more supply mains, a 36 in. cast-iron line was laid in 1943 from Calallen to Savage Lane at the western city limits. This 14½-mile pipeline was started July 20 and completed Nov. 20, just four months later. It is enamel-lined. laid with neat cement joints. The new line, delivering 14 mgd. and costing $890,200, was largely financed by FWA grant. However, as a condition of the grant, the government refused the city permission to build for a capacity beyond that expected on Jan. 1. 1944, though the consulting engineers wanted to lay a larger main.

At the same time a 10-mg. covered concrete reservoir was built at the terminus of the new line at Savage Lane to balance the distribution system. A 15-mgd. pumping plant, costing $216,000, was also installed at Savage Lane. Meanwhile more pumps were squeezed into the Calallen plant, raising the pumping capacity to the limit of the supply mains, 27 mgd.

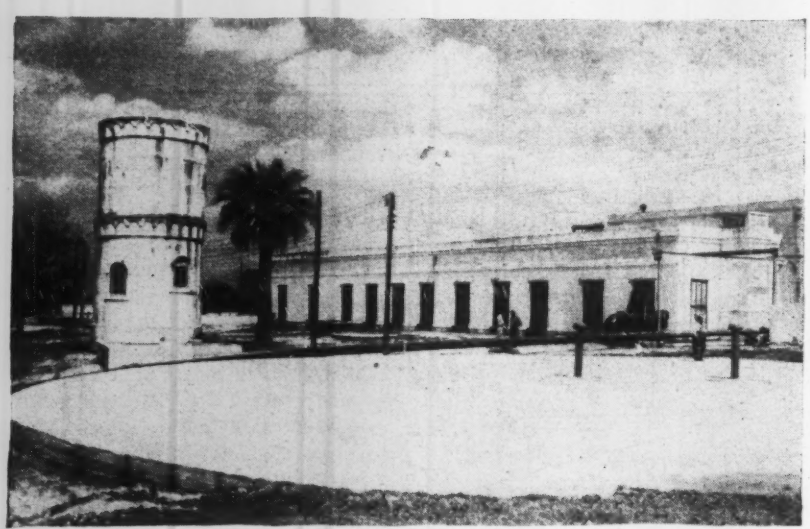


Fig. 4. One emergency raw water line cut through the wall of the pumphouse and another bypassing the pump plant formed part of the special measures taken to meet the rapidly expanding water demand.

Big jump in 1944

There was still no rest for the harassed waterworks men, for in 1944 the average daily demand jumped 23 percent to 16 mgd., while the maximum demand more than doubled, soaring to 27 mgd. The filters, with a capacity of only 18 mgd., now became the bottleneck in the system.

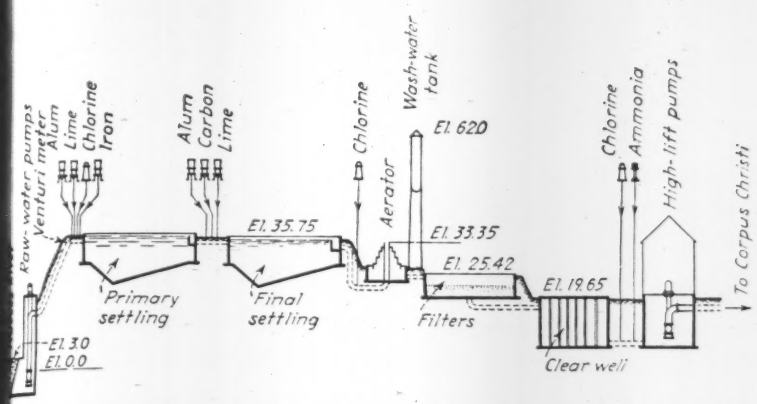
Because of wartime restrictions, it was not believed possible to obtain additional equipment and to build a new filter plant within a reasonable time. Instead, a second 5 mg. secondary settling basin was hurriedly built on the high ground location alongside the one built only two years previously to ease the load on the filters.

Again, more and more pumps were thrown into the Calallen plant—raw water, intermediate and high lift. But now there was no room for more pumps in the raw water suction pit, so emergency suction lines were installed with the pumps outside the pumphouse. The pipe gallery became so cluttered that new pipes had to be placed outside the gallery, some crossing through various building walls. Control valves were installed at odd angles to clear pipes, walls and the gallery roof. In the high-lift basin pumps were jockeyed around to permit squeezing more units into an already jammed area. These additions brought the pumping capacity up to 33 mgd.

Meanwhile, new distribution lines within the city were added at a cost of $133,000.

Summary of present system

Since the first of the year additional pumping capacity of 10 mgd. has been added at Calallen. The present system consists of the following units: High lift pumps, 43 mgd.; intermediate pumps, between primary and secondary settling basins, 27 mgd.; four settling basins totaling 17.5 mg. capacity 35 mgd.; three filters with capacity of 18 mgd., (operated at 75 percent capacity); 20, 30 and 36 in. supply lines to the city capable of delivering 27 mgd., storage reservoir within the city, 20 mg., pumps with the distribution system 21.5 mgd.



. 5. Some day the Calallen plant will be revised and enlarged on an efficient is, as this operating diagram of the future plant shows. The renovated tment facilities will supply 50 mgd.

The new facilities installed in the 7 years and raising the capacity m 4 to 27 mgd., cost $3,247,000. cept for the FWA grant, the entire has been met from current water enues, and the grant is now being aid from the same sources.

With all this expansion, the water ation is still precarious, for the ent demand is right at the plant acity, and city officials foresee a ximum demand of 30 mgd. this ing summer. If requirements con- e to increase, of course, more rgency measures will have to be n, but it is hoped the demand will l somewhere near present levels. 00-kw. diesel generating plant has n ordered for Calallen as a safe- rd to the waterworks. At present plant is vulnerable to tropical ms that might interrupt the power ply.

Future plans

lans are being made for a greatly rged water system to be started as soon as war conditions permit. ditional land is being acquired at allen to accommodate the pro- d expansions.

ear the top of the list are two new rs to bring the total capacity up to mgd. A laboratory and office will ncluded in the new filtration build- Two more 5 mg. settling basins be built on the high grond, and present old primary sedimenta- basins will be abandoned. By in- ating a new 50 mgd. raw water e and pumping plant, delivering ctly to the high level basins, the ent intermediate pumps can be inated. A new chemical house is included with the new basin work.

One of the old primary basins will be converted to a 10 mg. clear well; the other will be removed to make way for a new high lift pumping plant of 50-mgd. capacity. Washwater pumps will be installed for both new and old filters. At present water for washing is taken off the high pressure mains.

A new reservoir on the Nueces River between Calallen and the present Mathis Dam will store 300,000 acre-ft. Several possible sites have been investigated, but the probable choice of dam location is at the hamlet of San Patricio, with the reservoir extending back all the way to Mathis Dam. This site would require a dam about 4½ miles long, but has the advantage of not flooding any towns, railroads, oil fields or major highways.

One of the first items in the new construction program will be another 16-mile supply line from Calallen into the city. This will be at least a 48-in. main which will raise the total supply line capacity to 60 mgd.

At Savage Lane an additional 16-mg. storage reservoir will be built and the pump plant there will be increased to 30 mgd. These pumps will all be operated by heavy-duty gas engines, and, with the present reservoir, will insure 26 mg. storage within the city in case of a breakdown in electric power.

Within the city three more 1-mg. elevated storage tanks will be required. Feeder mains costing $3,000,000 and additional distribution lines to cost $1,000,000 will also be needed.

Each facility in the new program will be designed for possible expansion whenever more capacity is required in the distant future.

Direction

Meyers and Noyes of Dallas and Corpus Christi, have been consulting engineers on all of the expansion work since 1938, with Edward N. Noyes, resident partner, in direct charge. This firm is also planning the future work. Alex McCormick, city engineer, is closely associated with all water supply activities. John W. Cunningham, veteran superintendent of waterworks is responsible for keeping the plant and appurtenant works in operation.

Improved Water Supply Suggested for Columbus

Recommendations for both immediate and long-range programs to increase the water supply in the Columbus, Ohio, area have been submitted by Service Director Elmer A. Keller to the city council. He suggested that a survey be made to determine if water is available from an underground river flowing through central Ohio beyond the southeast city limits; that immediate steps be taken to determine the location of a new reservoir on the Scioto River, north of Bellepoint, with plans to be purchased as soon as possible after the site has been decided upon; and that a study be made of the possibility of building dams on Big Darby and Big Walnut creeks west and east of the city, respectively. He also suggested that the city purchase the 33-acre quarry north of Bellepoint if it is found that its capacity is near one billion gal.; that flashboards be constructed on top of the Griggs and O'Shaughnessy dams at once to increase their capacity by 1.1 billion gal.; and that steps be taken to make permanent all present auxiliary supplies for use in an emergency.

Mr. Keller said it may be possible to utilize partially any federally sponsored flood control projects on either the Olentangy or Scioto rivers. He urged the dredging of the Scioto River basin in the downtown area and the raising of the dam south of the Main St. bridge to increase storage capacity. Another imperative need, he said, is a study of all water mains to determine leakage.

Rural Water Supplies in El Salvador

Lt. Col. H. W. Van Hovenberg
Chief, Institute of Inter-American Affairs
Field Party in El Salvador

Maj. Robert D. Mitchell
Ass't Chief, Div. of Health and Sanitation
Office of Inter-American Affairs

***Contents in Brief**—Potable water supplies were established at 9-mile intervals along the Inter-American Highway in El Salvador to facilitate travel. Technical direction in the development of springs and wells was furnished by the United States under a cooperative health and sanitation agreement with El Salvador.*

CONSTRUCTION of sanitary rural water supplies along the Inter-American Highway in El Salvador has been an important project of the Cooperative Inter-American Health Service operating in that country. Drinking water supplies, passing standard bacteriological tests, have been developed in locations averaging about nine miles apart along the highway.

National engineers, advised by U. S. members of the Institute of Inter-American Affairs Field Party, carried out the development in the period from July 1943 to October 1944. Orientation of the nationals for this work was established in the fall of 1942 when a course for sanitary engineers was conducted by the U. S. field party.

After the completion of the course, four men—Ricardo Dutriz, Leopoldo German, J. O. Duarte and Filadefio Barres—were sent by the Training Division of Institute of Inter-American Affairs to the Texas State Health Department for four months of training. There, chief engineer V. M. Ehlers provided a thorough course in rural sanitation in preparation for the duties they were to assume upon their return home.

In the meantime the U. S. Geological Survey had loaned Dr. A. Nelson Sayre and George C. Taylor, ground water hydrologists, to the Institute of Inter-American Affairs to carry out investigations along the highway route and elsewhere in El Salvador. As a result of these investigations recommendations were made of suitable locations for water supply developments, both for urban and rural areas. These notes are concerned with the development of rural water supplies along the Inter-American and Emergency Military Highways.

Need for water supplies

Development of such water supplies became doubly important when lack of gasoline made ox cart transportation once again the backbone of local transportation. Frequent watering places were essential to keep the freight moving. Small communities showed great interest in the work and often contributed small sums to help carry on the developments.

It may be noted that in El Salvador the Emergency Military Highway coincides with the Inter-American Highway from the Guatemala border to San Miguel. At that point the later highway diverges to the southeast into La Union while the Emergency Military Highway turns slightly north of east to the Honduras border.

In general two types of developments were made—springs and wells. Eleven spring developments are included and eleven wells.

A typical spring development consists of a covered curbing with outlets spaced vertically to provide priority system in the delivery of water. First priority is always given to the drinking water tap; second usually to laundry tubs; and third to a stock-watering tank.

PARTIAL ANALYSES OF WATER SUPPLIES IN EL SALVADOR

Type of Supply	Number examined	Hardness			Total Alkalinity*			Chlorides		
		Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.
Springs	48	28	92	180	28	104	208	0	10	30
Wells	17	88	173	316	58	150	298	4	29	102
Lake	1	124	124	124	134	134	134	2	2	2

* Four springs showed small amounts of phenolphthalein alkalinity.

Fig. 1. Spring-fed water supply facilities at El Gavilan on the Inter-American Highway route through El Salvador. The drinking water tap in the center foreground taps the supply pipe before it empties into the laundry tub section. A stock-watering trough is shown at the left end.

Such developments were made at dras Azules (1), El Gallo (2), El ra (3), El Milagro (4), Colon), El Carmen 9), El Carrizo (15), M 159 of the Emergency Military ghway (16), and El Gavilon (21). An extremely interesting spring elopment was made at Santa Mar- ita (5) where a seepage vein some) ft. long was made to yield a maxi- m flow by drilling horizontal wells three-foot centers for 4 ft. into the vain and inserting porous pipes to ect the water. An enclosed col- ing gallery was constructed along length of the vein, leading the er into a covered reservoir from ch a jug-filling tap delivers water. flow from the stream was very ll prior to development but since completion of the work, enough er has always been available for nearby community of Santa Mar- ita as well as for passers-by. A newhat similar development was de at El Jicaro (17) although the izontal wells were not used.

Shallow well supplies

Shallow wells were provided at Joya (6), Michapa (8), San fael Cedros (10), Rio Jiboa (11), M 58.75E (12), KM 60.75E (13), M 63E (14), Rio Rebalse (18), raflores (19), Rio San Antonio) and at a military highway work mp near the Honduran border. A typical well is about 33 ft. deep. ft. square with a 10 ft. reinforced crete curbing. Each well has a 6 ft. concrete slab on the surface d ordinarily has a standard hand mp. At La Jayo (16) instead of conventional hand pump a pro- ted type of "rope and bucket" mp was used. The bucket is simi- to a well-bailer and is raised by a d windlass. At the top of its travel imple cam arrangement trips the ler "valve" causing the water to into a trough discharging out- e of the pump housing.

An examination of the key map ws that these water supply de- opments are spaced closely to- her except near San Salvador and t of San Miguel. Developments e not made near San Salvador be- se of the existence of adequate plies in that area. Shallow or sur- e sources of supply are largely king in the area west of San guel, and the problem in this area till being studied.

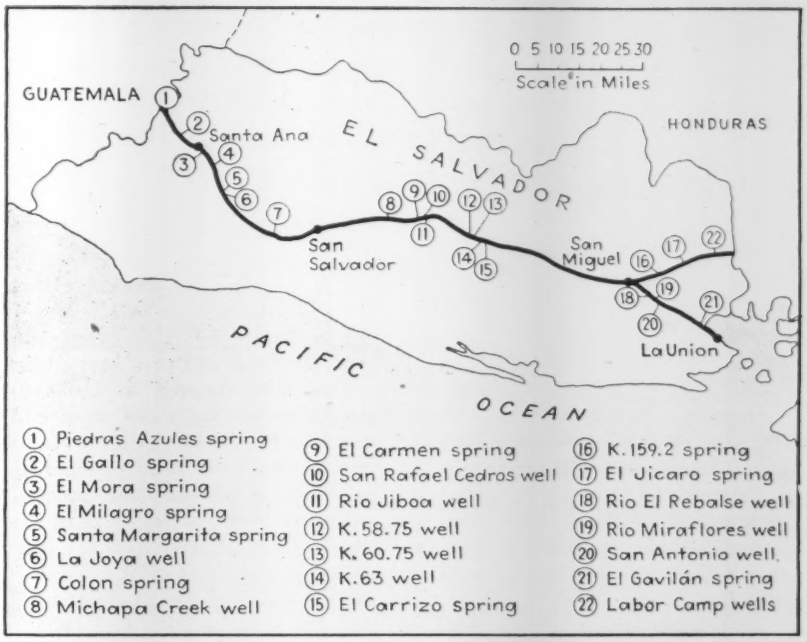


Fig. 2. Location of rural water supply developments on the Inter-American Highway route in El Salvador.

The waters obtained from these developments have not been chemically analyzed except in a few cases. However, as a part of the survey work carried out by Dr. Sayre and Mr. Taylor partial analyses were made of 66 different but similar water supplies. Of the 66 examined, 48 are springs, 17 are wells and one is derived from a lake. Of the supplies examined, 71 percent had carbonate hardness only while the remaining 29 percent had both carbonate and non-carbonate. There appears to be no regional variation in hardness. A summary of the data is shown in the accompanying tabulation.

The senior author has been chief of the field party and director of the Inter-American Cooperative Health Service in El Salvador since July, 1943. In this work he was assisted by Lt. Clyde T. Norman. The El Salvador work is operated under the general direction of the Division of Health and Sanitation of the Office of Inter-American Affairs of which Col. H. B. Gotaas is director.

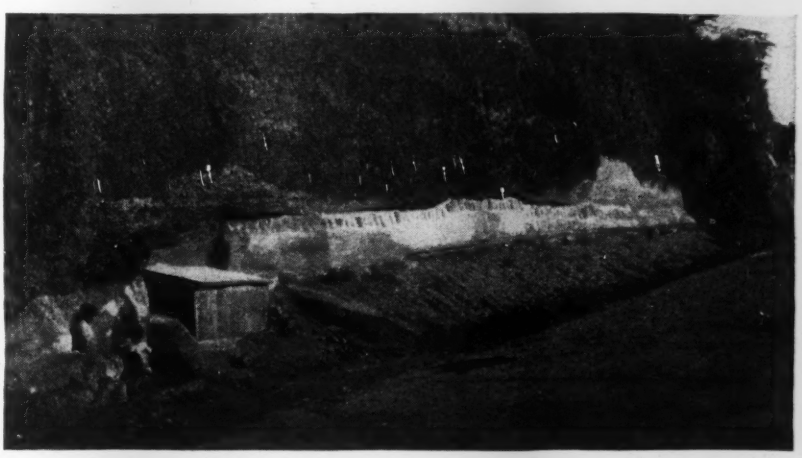


Fig. 3. A seepage vein in one of the highway cuts near Santa Margarita was tapped with a series of horizontal porous tubes to provide an adequate supply of water. Glass enclosed collecting gallery.

Seabee Waterworks in South Pacific Features Many Improvisations

SUPPLYING an advanced U. S. Navy fleet base in the Southwest Pacific area is a water purification plant and distribution system in which there are more improvisations than standard units.

Capable of supplying a city of 60,000, the system is semi-permanent, and it might be made permanent by a few substitutions. From the intake pumps to the storage tanks, sections were substituted or fabricated on the spot for those not available on the island.

The supply comes from a river in the coastal mountain overlooking the fleet base. It was necessary to build 7,500 ft. of road to reach the source. The water is taken from a natural pool at the head of a 100-ft. waterfall, and thus the Seabee engineers who built the system in seven weeks avoided the necessity of constructing a dam.

No water pumps were available on the island, so the supply is handled at various points in the system by gasoline and fuel oil pumps originally destined for use at tank farms.

The sedimentation tank is a 10,000-bbl. oil storage tank, and the agitator was improvised from a gasoline engine geared through a winch taken from the front end of a heavy truck.

The filters, housed in 15,000-gal. wood-stave storage tanks, were fabricated on the island. After travelling through standard beds of sand and aggregate, obtained and processed locally, the water is drawn off through a network of welded pipe. The intake pipe was constructed of a series of welded gasoline drums from which the tops and bottoms had been removed. The backwash tank was designed originally for oil storage.

Gate valves of wood

A triumph of the on-the-job fabrication are the gate valves which control the flow of water. Gate valves were nowhere obtainable for the system, so Construction Battalion shipfitters collaborated with carpenters mates and built wooden gate valves, operating on the conventional wedge principle. After a period of persistent adjustment the valves were made water-tight and proved very serviceable.

Chlorine is piped into the system gravity feed from a chemical mix house, and the water then pas through a large oil storage tank wh does service as a surge tank. M gasoline and oil pumps force water into five 10,000-bbl stor tanks.

Whereas the standard water pu fication plant employs mostly c crete construction, the island pl uses concrete tanks only for mix vats in the chemical preparat house.

Daily capacity 3 m.g.

The plant is capable of treat 2,100 gal. a minute, each filter tu ing out 350 gal. in that period. S three million gallons of water treated each day, of which a mill is consumed by facilities ashore. a two millions are made available ships.

Because the storage tanks are 2 ft. above sea level, on the mounta side overlooking the base, the wa pressure is 114 lb. per sq. in.

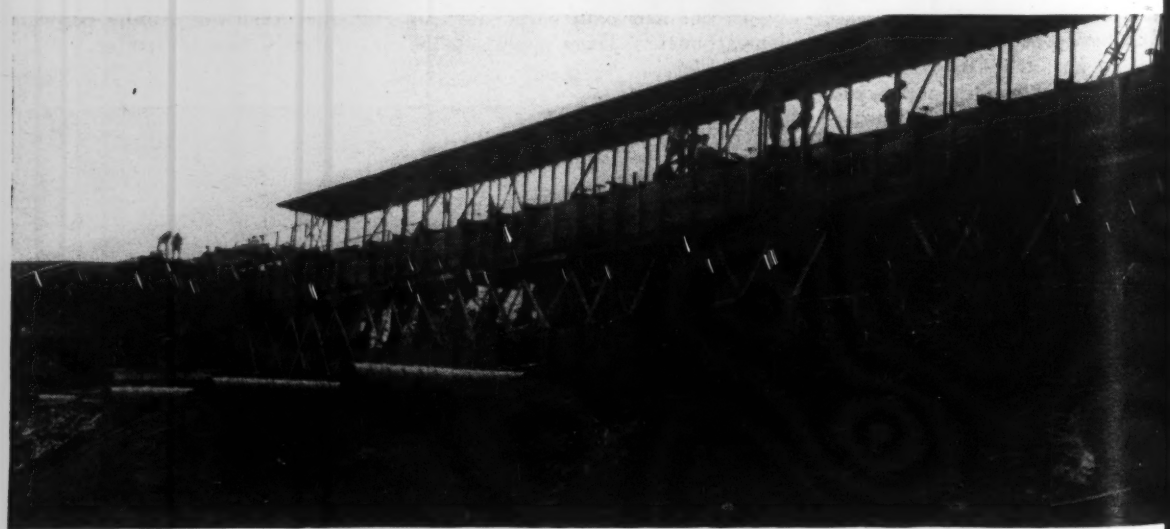


Fig. 1. Water filtration plant, built entirely of wood, at an advanced Navy base in the Southwest Pacific. The filt consist of six 15,000-gal. wood stave tanks filled with sand and coarse aggregate. Large diameter pipe was fabricat by welding together gasoline drums from which the tops and bottoms had been removed.

Fig. 2. Filling the filters with washed sand. Each filter has a capacity of 350 gpm. Right: A natural pool at the head of a 100-ft. waterfall was deepened to provide a source of supply without the need for a dam.

The water is piped to the base facilities and to the fleet outlet through four and a half miles of welded and coupled 12-in. pipe, which is connected to local distribution systems: the latter originally carried water from emergency purification plants.

The plant would be valued at about $400,000 in the United States, according to Capt. Wallace B. Short, CEC, USN, of Meridian, Miss., Officer in Charge of the Navy Construction Brigade that built the system.

In charge of construction, on which 200 Seabee craftsmen worked seven weeks, was Lieut. Lewis G. Phillips of Washington, D. C., Comdr. H. P. Colony of St. Petersburg, Fla., supervised the project as Officer in Charge of the Construction Regiment to which it was assigned.

Lightweight Water Purification Unit

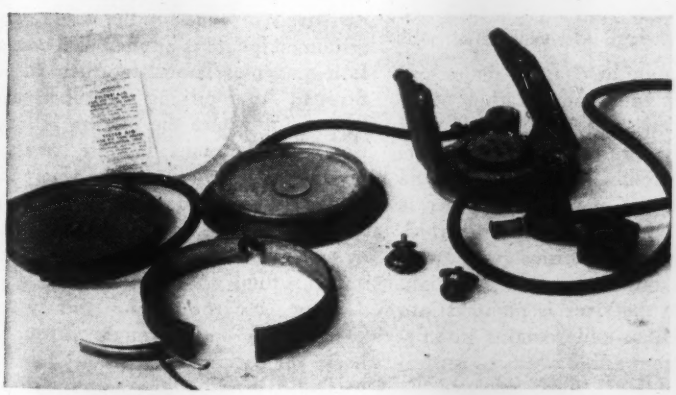
A small water purification unit weighing but 7 lb., including a carrying case, and capable of producing an average of 1 qt. of potable water per minute is now being used by U. S. Army forces. Water is drawn into the unit by action of a self-priming diaphragm-type pump with spring-loading poppet-type valves as shown in the accompanying illustration. The water passes through two receiving chambers, one above the upper filtering surface and the other below the lower filtering surface of the central filter supporting element used in the unit.

Asbestos filter pads are employed as the filter media in normal operation. When the unit is operated at the rate of 1 qt. of water per min., each pair of pads can be expected to filter satisfactorily for 20 qt. of water. Chlorinating chemicals are provided to destroy the bacteria which cannot be filtered out.

The inlet and outlet are $\frac{5}{16}$-in. neoprene tubes. Attached to the suction end of the inlet tube is a helically wound wire strainer with a soft rubber guard; a 1-in. dia. cork float is attached to the guard to keep the tube suspended a few inches below the surface of the water rather than on the bottom where the pump would suck mud and sand.

The unit, which cannot be used for treating sea water, is transported about in a canvas carrying case that is water repellant and mildew resistant.

This description was made available by the Corps of Engineers personnel serving with the Aviation Engineers. The unit was developed by Wallace & Tiernan Co., Newark, New Jersey.



Left: Purification unit dismantled to show individual parts. Right: Carrying case, which measures 7 x 7 x 6 in., is divided into two parts. One compartment holds the pump and filter unit, and the other contains the filter pads and chlorinating chemicals. This unit will supply one quart of treated water per minute.

Incrustation of Water-Filtration Sand

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***Contents in Brief**—Recent investigation and analysis of sand from two representative filters of the St. Paul, Minn., water filtration plant disclose the amount of incrustation on particles of sand which have been in service for periods of five years and 22 years. Chemical analyses also were made to determine the character of the coatings.*

INCRUSTATION of the filter sand in water filtration plants often is a vexatious problem to operators since the efficiency of the plant and quality of water produced vary inversely to the amount of incrustration. In an attempt to determine the character and extent of these harmful effects and how best to remedy them, extensive investigations recently were made on the incrusted sand in the rapid filters of the St. Paul, Minn., water softening and filtration plant. The investigation offered an excellent opportunity to study filter sand under two widely separated conditions; one, sand that had been in service for 22 years, and another that had been used in water softening for a period of only five years.

Originally constructed in 1923, the plant functioned only as a filtration plant until 1940. At that time it was enlarged, six new filters were added and the installation was modified to include lime-soda softening (*ENR* June 8, 1939, vol. p. 792). St. Paul gets its water supply from the Mississippi River, at an intake located 20 miles away. It is conveyed to the plant by way of conduits, open canals and four lakes.

The writer believes that the character of the raw water, as well as the type of treatment, plays an important part in determining the nature of the deposit on the sand grains. Hence, this article deals only with the investigation of the incrusted deposits from the standpoint of the character of the water treated and the type of treatment as these factors influence the sand grain coating.

Results of the investigation show many things of interest to waterworks engineers: (1) The comparatively high organic content of the river and lake waters is both dissolved and suspended and may not be removed by the water treatment process. (2) Mineral and organic matter are deposited on the sand grains, with the heaviest deposit being found in the top 2-in. layer, slightly less in the top 7-in. layer and the least deposit in the bottom 7-in. layer. (3) The sand analysis indicates that the organic matter is dispersed throughout the entire body of the sand bed and the incrustments on the sand grains may be dislodged at any time by mechanical action or dissolved by chemical activity. (4) The reaction of the water applied to the filter sand influences to a considerable degree its tendency to form an incrustment or to remove an existing crustment and (5) organic matter is wrapped up in the incrusting material in such a manner that when the deposit is removed from the filter sand, an undesirable odor may be liberated in the water.

Lake storage of river water

In analyzing the characteristics and amount of sand incrustation it is well to discuss briefly the character of the raw water supply and its method of treatment. In general, the organic content of the river water is high (Table I), and the color, turbidity and micro-organisms vary with the season but they often are high. Water from the river is pumped into the lake system and remains in storage there from a few weeks to several months. While in lake storage the water is subjected to sedimentation, aeration, sunlight—factors that aid in its purification. However, the growth of micro-organisms interferes with and sometimes nullifies the beneficial effects of passing the water through the lakes. And the presence of this organic matter in the water contributes to building up the calcium and magnesium on the sand grains, as will be shown.

From 1923 to 1940 all of St. Paul's water was treated with aluminum sulphate and filtered, with the original sand being retained throughout this period. During this interval the sand grains acquired a pronounced coating of vegetable matter. At the time of reconstruction, the softened water was applied to the sand in the old filters without cleaning them.

Since 1940 the water has been treated with sufficient calcium hydroxide to eliminate the bicarbonates of calcium and magnesium. It has not been necessary to apply soda-ash as a part of the softening treatment since the water is of low non-carbonate hardness. Lime used in water treatment is slaked in the softening plant.

Filters carry high organic load

In operating the plant the lake water enters the influent lines, is aerated for the removal of mal-odors and treated with lime at the required rate for softening. As soon as the lime is dispersed throughout the water, aluminum sulphate is applied as a coagulating agents. The water then passes through the mixing chamber and flocculator where the mixing is long, slow, and complete. It flows from the flocculator to two clarifiers, where the sludge is removed. At the outlet of the clarifiers the water is recarbonated at such rate as to bring the filter effluent to a final *pH* of 8.2 to 8.5

After recarbonation, the water passes into and through a settling basin for secondary settling. The detention period of the water in this secondary basin is 6 hr. and 12 min., for a normal rate of 25 mgd. But when the summer peak of 65 mgd is

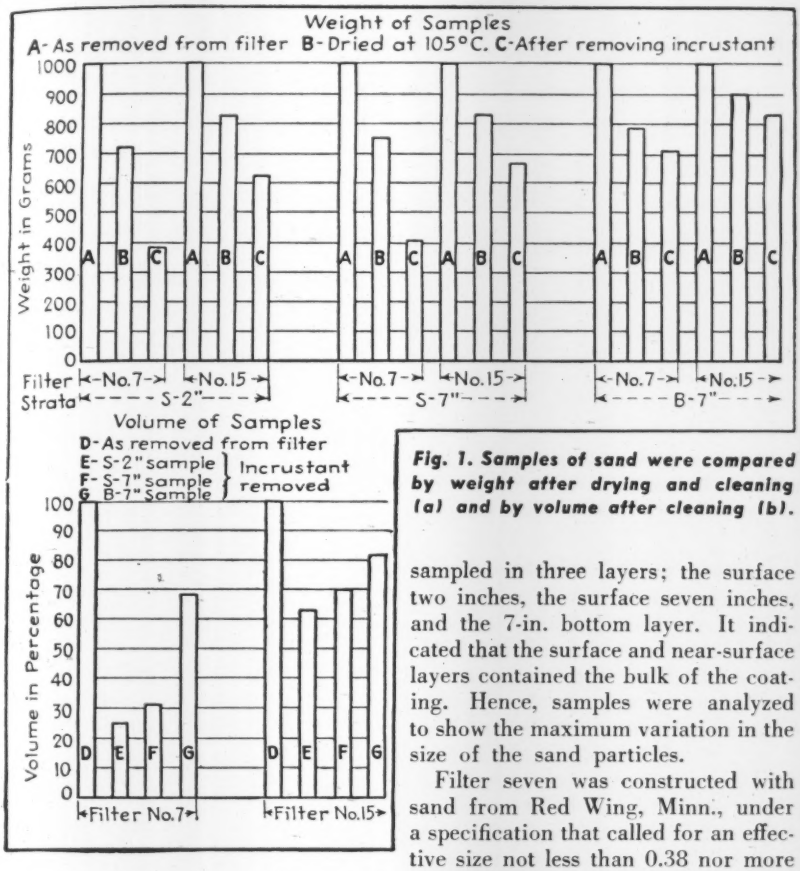


Fig. 1. Samples of sand were compared by weight after drying and cleaning (a) and by volume after cleaning (b).

reached, the detention period is cut to 2 hr. and 24 min. In the type of water treated in this plant, however, a detention period of 2 hr. and 24 min. is too short to be effective. Hence, during periods of high demand and during the time when the micro-organisms of the water are at a peak, a more than normal load of organic matter is thrown on the filters. Through long use, the sand particles have been covered with a comparatively thick layer of organic material.

Two types of sand investigated

The investigation of the sand and the coating thereon covered in this paper applies to the sand in two filters—No. 7 and No. 15. Sand taken from filter seven had been in continuous service from 1923 to 1939 for filtering alum-coagulated water, and since 1940 for filtering lime-softened water. The filters were thoroughly backwashed and then drained before sampling the sand, which was done by driving a metal container into the sand layer and removing it carefully so as not to disturb the core of sand in the container. The filter sand was sampled in three layers; the surface two inches, the surface seven inches, and the 7-in. bottom layer. It indicated that the surface and near-surface layers contained the bulk of the coating. Hence, samples were analyzed to show the maximum variation in the size of the sand particles.

Filter seven was constructed with sand from Red Wing, Minn., under a specification that called for an effective size not less than 0.38 nor more than 0.42 mm., with the uniformity coefficient not above 1.75. The screen analysis of the sand as placed in the filter is from a sample that was stored in the laboratory from the time the plant was constructed. Due to the plant revision in 1940, filter seven has functioned nearly 17 years for filtering alum-treated water, and for the past five years for filtering lime-softened water. Its depth of filter sand has been kept to about 27 in. Three samples of sand were taken from the filter for analyses. The 2-in. surface layer is designated by S-2", the 7-in. surface layer by S-7", and the 7-in. bottom layer by B-7".

Filter fifteen was constructed with sand from Eau Claire, Wis., under a specification calling for an effective size of 0.45 to 0.50 mm. and a uniformity coefficient of 1.25 to 1.50. As in filter seven, the sand in this filter was sampled at three depths, with corresponding designations. This filter, which has a 25-in. depth of sand, was constructed in 1939 and placed in operation the following January. It has been used only for filtering water treated by the lime softening process.

Filter seven has a low rate of backwash, with a miximum vertical rise of 24 in. This rate of backwash is insufficient to provide for adequate cleaning of the filter sand under some operating conditions, as during periods of high algae, crustacean, or larvae growth, the sand becomes dirty and the particles become cemented together so that complete movement of the sand is impossible. Under such conditions the sand is moved by shoveling or is broken up during the backwash by the use of poles equipped with metal blades on the end. The sand in this filter accumulates organic matter rapidly during such periods.

Filter fifteen is equipped with a high rate of backwash. A maximum rate of 48-in. vertical rise is available but never used, since a vertical rise of backwash water of 30 in. per min. maintains the filter sand in satisfactory condition in so far as backwash is concerned. The sand in this filter has been free from cracks, checks and rough surfaces. It has operated with the minimum attention and appears to be in good mechanical condition.

Sand tests in filter number seven

Samples of sand from filter seven were collected after backwashing, and the water was drained from the sand body. The wet sand was weighed and the weights recorded (Table II). It then was dried on the water bath until

TABLE I—ORGANIC CONTENT OF RIVER AND LAKE WATER

(Mississippi River Water)

Year	Turbidity p.p.m.	Color p.p.m.	Albuminoid Ammonium-N p.p.m.	Oxygen Consumed p.p.m.	Oxygen Dissolved p.p.m.	Loss on Ignition p.p.m.	Micro-organisms Std. Units	Amorphous Matter Std. Units
1942	7	74	0.560	14.9	9.9	107	859	1,132
1943	17	90	0.330	13.7	8.6	100	432	1,269
Lake Water—entering plant								
1942	3	45	0.485	13.7	9.2	94	1,705	245
1943	3	48	0.368	12.8	9.0	95	958	281

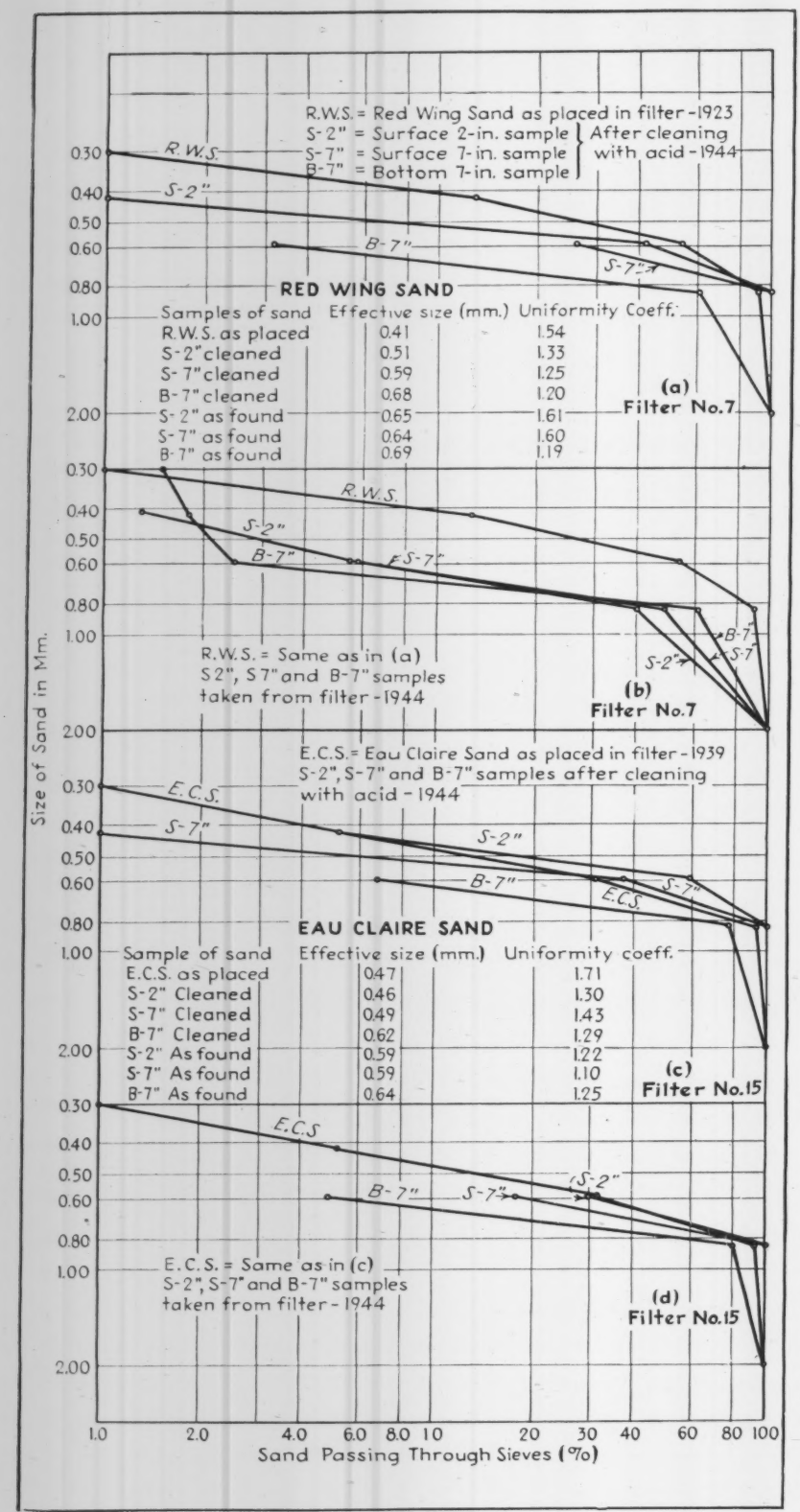

R.W.S. = Red Wing Sand as placed in filter - 1923
S-2" = Surface 2-in. sample } After cleaning
S-7" = Surface 7-in. sample } with acid - 1944
B-7" = Bottom 7-in. sample
RED WING SAND
Samples of sand | Effective size (mm.) | Uniformity Coeff.
R.W.S. as placed | 0.41 | 1.54
S-2" cleaned | 0.51 | 1.33
S-7" cleaned | 0.59 | 1.25
B-7" cleaned | 0.68 | 1.20
S-2" as found | 0.65 | 1.61
S-7" as found | 0.64 | 1.60
B-7" as found | 0.69 | 1.19
(a) Filter No.7
R.W.S. = Same as in (a) S-2", S-7" and B-7" samples taken from filter - 1944
(b) Filter No.7
E.C.S. = Eau Claire Sand as placed in filter - 1939 S-2", S-7" and B-7" samples after cleaning with acid - 1944
EAU CLAIRE SAND
Sample of sand | Effective size (mm.) | Uniformity coeff.
E.C.S. as placed | 0.47 | 1.71
S-2" Cleaned | 0.46 | 1.30
S-7" Cleaned | 0.49 | 1.43
B-7" Cleaned | 0.62 | 1.29
S-2" As found | 0.59 | 1.22
S-7" As found | 0.59 | 1.10
B-7" As found | 0.64 | 1.25
(c) Filter No.15
E.C.S. = Same as in (c) S-2", S-7" and B-7" samples taken from filter - 1944
(d) Filter No.15
Size of Sand in Mm.
Sand Passing Through Sieves (%)

Fig. 2. Gradation of sand was determined for samples from filter seven after cleaning with acid (a) and as taken from filter (b). Similar sieve analyses were made on samples from filter fifteen (c) and (d), respectively.

most of the water was removed and afterwards dried in an oven to constant weight at 105 deg. C. After drying to constant weight, the sample was treated with hydrochloric acid for the removal of the incrustant and again weighed.

The percentages of loss in weight by drying the sand and by removing the coating is recorded in Table II. It will be noted that the water-holding capacity of the sand is increased by the organic deposit accumulated on the surface of the sand particles. The percentages of loss in weight by drying the sand samples show that the 2-in. surface layer contained the highest moisture content, and the largest deposit of organic matter. Also that the 7-in. surface layer contained slightly less moisture and less organic matter, while the 7-in. bottom layer contained the minimum amount of both moisture and organic matter. Removal of the deposit from the sand by application of hydrochloric acid appears to give a reduction in each case comparable to the reductions in moisture.

Sand samples removed from the filter bed had a fixed volume as found in place in the bed. The volume of the same samples is shown after the sand was cleaned by acid treatment and dried (Table II). Note that the 2-in. surface of sand showed the largest shrinkage by removing the deposit with acid treatment (74.5 percent), while the 7-in. surface layer shrunk 69 percent and the bottom 7 in. stratum had a 31.5 percent shrinkage, which is rather large. This percentage of shrinkage indicates that the deposit is dispersed throughout the body of the filter sand bed.

Screen analyses

Filter sand samples were collected from the same layers, dried, and prepared in a similar manner for screen analysis by the "Hazen" method. Results are shown graphically in Fig. 2a and 2b. The curve marked R.W.S. is for the sand as placed in the filters in 1923, taken from a sample preserved in the laboratory. Curves in this chart show the results of screen analysis of the sand as removed from the filter and after treating with hydrochloric acid to remove the incrustant. The curves from the untreated samples of sand indicate that the grains have increased in size and become quite uniform in size on all layers.

Samples cleaned with hydrochloric acid show a tendency for the grains to differentiate according to layers as in the original body. The sand in the filter was originally graded hydraulically so that the finer grains were on the surface layer and the coarse ones on the bottom. The fine sand on the surface layers was incrusted until it had grown to the size of the bottom sand, but cleaning the sand restored the different sizes and particles.

The percentage passing through the 0.59-mm. and 0.84-mm. sieves (Table III) shows how the size of the sand particles changes after the coating is cleaned from them. A comparison of the figures for filter seven in Table III shows that in the S-2″ sample as taken from the filter, 5.8 percent passed through the 0.59-mm. sieve, but after cleaning the sand with acid, 42 percent passed through the same sieve. The B-7″ sample shows a comparatively low percentage loss by acid treatment on both the 0.59.mm and 0.84-mm. sieves. Similar data were found to apply to the samples from the other filter. It should also be noted that the sand particles in filter fifteen have not increased in size to the same extent as those in filter seven.

Chemical analysis

The samples from filter seven were subjected to chemical analyses to determine the character of the coating on the sand grains. Results of these analyses are summarized in Table IV, which indicates that the greater portion of the sand coating was composed of calcium carbonate, while the magnesium content of the deposit was comparatively low. Iron and manganese were present in the coating only in minute quantities, and the aluminum content was normal for sand used to filter water coagulated with aluminum sulphate. Organic matter and unaccounted-for material was high in the surface samples but comparatively low in the bottom sample. Just how much of this component is organic matter is difficult to determine.

After the samples of sand were heated to boiling with aqua regia, organic matter still persisted in the acid solution, which remained dark-colored and had the sugary odor encountered when cellulose is boiled in an acid solution. A heavy, black, tarry material was removed from the acid-treated sand samples. All in all, the organic matter of the sand is high and very difficult to remove by any type of acid treatment, the difficulty experienced in this respect indicating that the sand in this plant cannot be recovered or cleaned by any of the methods advocated for cleaning filter sand.

Filter number fifteen

Samples of sand from filter fifteen were collected and handled in exactly the same manner as those from filter seven. Filter fifteen, however, had been put into service when the plant was converted to a water softening plant and had been filtering only lime-softened water for five years. Hence, the picture presented by the sand from this filter should be somewhat different from that of filter seven. The loss of weight by drying and by acid treatment is not as high as that of filter seven but the percentage of loss in each case is larger on the basis of the period of operation. It would seem fair to expect, however, that the percentage of incrustation on the sand grains might be at a higher rate during the first years of operation than over the following and longer period.

The volume of the sand in filter fifteen decreased in a higher proportion than that of filter seven. The percentage of loss in volume of filter seven was 74.5 percent for a period of 21 years, while the percentage of loss in volume of sand from the other filter was 37 percent for a period of five years. These figures seem to hold for all three layers of sand under investigation. Viewed from the standpoint of deposit accumulated, it would seem that the sand grains increase in size much faster in the early period of their service or that they reach a maximum size and stop their growth. Or it may be that the clean sand grains increase in size by incrustation of lime at a faster rate than the sand grains that already had a coating of alum and organic matter.

The graphs for filter fifteen (Fig. 2c and 2d) present a picture somewhat different from that of the other filter tested. This sand has changed somewhat from the sand as placed in the filter but not in a manner comparable to that of filter seven. The sand in filter fifteen was new sand, so it may change by hydraulic grading and by incrustation from the lime and alum. The sand removed from the filter indicates that hydraulic grading played a major part in producing these particular types of curves. Thus, the curve representing the B-7″ layer departs widely from the curve showing the sand as placed in the filter (E.C.S.), and the S-2″ and the S-7″ curves show that the fine sand has either been removed by filter backwash or that it has increased in size due to the incrustant.

Curves showing the results of screen analysis after removing the incrustant with acid indicate that the small grains had increased in size, but the B-7″ curve shows very little difference from the curve on the non-acid treated sand.

Character of coating

Chemical analysis of the sand from filter fifteen was made to determine the nature of the deposit as compared with the other filter (Table IV). Lime deposits were lower on the S-2″ and the S-7″ samples, but for the B-7″ sample it was greater than that found on the sand from filter seven. However, the organic matter and unaccounted-for portion remains comparatively low. The low organic content

TABLE II—REDUCTION OF SAND SAMPLES ON CLEANING

	Red Wing Sand—Filter No. 7			Eau Claire Sand—Filter No. 15		
	S-2″	S-7″	B-7″	S-2″	S-7″	B-7″
Weight of sand (grams):						
1. From filter	1,132	2,320	2,798	1,388	3,035	3,131
2. Dried at 105 C	822	1,745	2,462	1,150	2,522	2,821
3. Acid treated	434	964	2,285	879	2,100	2,600
A. Loss by drying sand (%)	27.4	24.8	12.0	17.	16.9	9.9
B. Loss by acid treatment (%)	47.2	44.8	7.2	23.6	16.7	7.8
Volume of sand as taken from the filter (Liter)	1,000	1,900	2,050	1,000	2,030	2,070
Loss by acid treatment (%)	255	590	1,405	630	1,420	1,700
Volume of sand after acid treatment (Liter)	74.5	69.0	31.5	37.0	30.0	17.9

A—Percentage loss of moisture by drying sand at 105° C. (1–2)
B—Percentage loss of incrustant removed by treating dried sand with hydrochloric acid (2–3)

TABLE III—PERCENTAGE OF SAND PASSING MEASURING SIEVES

Filter No. 7

Stratum	0.59-mm. dia. sieve S-2′	0.59-mm. dia. sieve S-7′	0.59-mm. dia. sieve B-7′	0.84-dia. sieve S-2′	0.84-dia. sieve S-7′	0.84-dia. sieve B-7′
Sand as taken from filter (%)	5.8	5.5	2.3	40.3	49.0	61.0
Sand cleaned with acid (%)	42.0	23.5	3.2	100.0	92.0	61.0
Filter No. 15						
Sand as taken from filter (%)	29	18	5	100	94	80
Sand cleaned with acid (%)	59	37	7	100	100	77

of the filter fifteen sand places it in a more desirable category for producing odor-free water. The analysis also indicates that the new sand has a tendency to incrust more rapidly than that in use for a long period. However, the comparatively low organic content in the sand deposit lowers the probability of the sand contributing odor to water filtered through it.

Inspection of the filter sand samples after drying shows that the two sands differ in appearance and character, and after removing the incrustant from them the two may be differentiated readily. While the Red Wing sand is light in color and consists almost entirely of silicate particles unstained by iron or manganese, the Eau Claire sand is dark in color and contains many colored grains, some of these grains being composed of iron and magnesium silicate. Shapes of the sand grains serve also to differentiate between the two samples.

Characteristics of sand

Sand from both filters is contaminated somewhat with black particles of irregular shape and plastic interior, a number of these black particles being found in the sand after it was cleaned with acid. Analysis of the black (organic carbon covered) particles showed that they contained 60 percent silica. An experimental run was made in 1943 using sodium silicate to aid in coagulation and it is believed that the silica particles found are non-soluble particles of sodium silicate that remained in the filter sand.

Ability of the two sands to filter a volume of water and to remove impurities is a check on their efficiency. Insofar as removal of impurities from the water is concerned, it has not been practicable to differentiate between the effluents of the two filters. The volume filtered between each backwash, however, offers a means of differentiating between the filters from the viewpoint of water treated. In each instance the volume passed through the filters of long-time service and incrusted sand grains is larger under the same conditions than that of the newer filters with less-incrusted sand grains. It scarcely seems that the difference in the size of the sand grains in the two filters is enough to explain the difference in volume of water filtered (Table V).

Chemical reactions

Sand that is incrusted with a layer of mineral and organic matter is difficult to use for water purification, as the incrusting layers are likely to slough and pass into the filtered water. And water passing through the filter sand must be kept at such reaction that the sand will continue to retain the incrusting matter by attracting the particles and never repelling them. In other words, if the water is retained at a fixed *pH* the chances of the incrustants leaving the sand grains, except by mechanical action, will be reduced to a minimum.

In a water softening plant where the reaction of the water can be controlled by producing alkalinity by means of lime treatment and neutralizing the alkalinity by means of recarbonation, the water may be kept at a fixed reaction. If the reaction indicated in the formula $CaCO_3 + CO_2 - H_2O$ is regulated to maintain constant balance, that is, no excess of either lime or carbon dioxide in the finished product, the water will have a *pH* value of 8.3.

Unbalanced reaction results

When the calcium carbonate increases so as to unbalance the equation, the *pH* value will rise and the water will have a tendency to incrust, the calcium carbonate plating out on the sand grains, the metal surface of boilers, and other surfaces with which it comes in contact. If the calcium carbonate content of the water increases beyond the saturation point, a sludge or lime coating will form rapidly on any contact surface.

If, however, the equation becomes unbalanced by the application of an excess of carbon dioxide, the *pH* value of the water drops below 8.3. After the carbon dioxide has dissolved and neutralized all excess lime, it will accumulate in the water as free carbon dioxide, or combine with the water to form carbonic acid, removing the calcium carbonate from the sand particles. This re-dissolving of calcium carbonate from the sand particles is slow but noticeable, and liberates organic matter that was part of the incrustant. The mineral matter passing into the filtered water is of little consequence, but the organic matter is sometimes in a state of putrefaction and produces offensive odors when chlorination is applied. Inasmuch as these odors are created beyond the filters, no treatment may be instituted to dispose of them.

Control of the application of chemicals to large volumes of water in such ratio as to produce a treated water of fixed *pH* is a difficult practical problem in water treatment. How-

TABLE IV—CHEMICAL ANALYSIS OF DEPOSIT FROM SURFACE OF FILTER SAND

Solvent used to remove deposit from sand was hot aqua regia

Stratum	Red Wing, Medium—Filter No. 7 S-2′	Red Wing, Medium—Filter No. 7 S-7′	Red Wing, Medium—Filter No. 7 B-7′	Eau Claire—Filter No. 15 S-2′	Eau Claire—Filter No. 15 S-7′	Eau Claire—Filter No. 15 B-7′
Analysis (%):						
Silica	54.90	72.20	93.70	73.50	89.00	93.40
Calcium-CaCO	25.90	22.60	3.90	20.40	9.20	4.70
Magnesium-Mg $(OH)_2$	4.69	1.16	0.50	0.63	0.27	0.25
Iron-Aluminum Oxides	2.70	1.70	0.80	1.00	1.00	1.10
Total	88.19	97.66	98.90	95.53	99.47	99.45
Iron	0.0008	0.0008	0.0024	0.0030	0.0040	0.0040
Manganese	0.0000	0.0012	0.0008	0.0004	0.0004	0.0004
Organic matter and unaccounted for material	11.81	2.34	1.10	4.47	0.53	0.55

ever, with proper equipment available, it is possible to soften water by the lime-soda process and recarbonate the water in a satisfactory manner.

Acknowledgment

Data incorporated in this article was made available through the courtesy of the Board of Water Commissioners and of Leonard N. Thompson, general superintendent and engineer for the St. Paul Water Department. Appreciation is also given Frank L. Foster, chemist and bacteriologist for the technical work done in preparing the data.

TABLE V—VOLUME OF WATER FILTERED DURING 1944

Month	Filter No. 7	Filter No. 15	Ratio of Water Filtered (Filter No. 7 to No. 15)
January	17,141,000	9,680,000	1 : 0.56
February	12,044,000	8,463,000	1 : 0.70
March	12,056,000	7,295,000	1 : 0.60
April	9,308,000	4,390,000	1 : 0.47
May	8,993,000	3,847,000	1 : 0.43
June	8,214,000	4,733,000	1 : 0.58
July	7,428,000	5,616,000	1 : 0.76
August	8,042,000	5,731,000	1 : 0.71
September	12,851,000	6,945,000	1 : 0.54
October	10,542,000	6,373,000	1 : 0.60
November	13,443,000	6,104,000	1 : 0.45
December	9,210,000	7,080,000	1 : 0.77

Mexicans Impressed with U.S. Sanitary Engineering Equipment

Mexican engineers are becoming very favorably impressed with the superior qualities of United States sanitary engineering equipment, according to William Martin Johnson, chief engineer of the Inter-American Cooperative Health Service in Mexico.

Recently returned to the United States for consultation with officials of the Institute of Inter-American Affairs, Mr. Johnson has supervised the construction of more than a dozen water supply and sewer construction projects in Mexico under the cooperative program. Working with him on the projects have been some of Mexico's leading sanitary engineers. The Mexican government has contributed the services of these engineers as well as sharing in the cost of the cooperative projects.

Many of the Mexican engineers have studied in the United States and are loud in their praise of United States engineers and their methods, as well as United States supplies. As a matter of fact, many of the recognized sanitary engineering courses in Mexico are taught from United States textbooks. Many Mexican engineers who are unable to converse in English are able to read the textbooks fluently.

Previously Mexico purchased a great deal of its sanitary engineering equipment from Europe, a large part of it from Germany. The equipment received from the Germans, via barter methods, is far less practical than corresponding United States equipment. Mexican engineers favor the stronger, more uniform United States equipment.

Water supplies and water treatment have been among the major projects of the Mexican program. Health centers, sewer construction, and sewerage treatment have been other major projects.

Last year the Institute of Inter-American Affairs was asked by the Mexican government to extend the cooperative agreement signed in 1942, in view of achievements under the program. The new agreement, which is to continue until 1945, calls for a contribution of $2,500,000 by the Mexican government, and a similar amount from the Institute. The previous agreement called for an expenditure of another $2,500,000.

Among the projects under construction in Mexico are nine water supply systems, four sewer projects, and two health centers. Another water supply system, a filtration plant and another health center are planned. Two of the water supply systems recently were nearing completion.

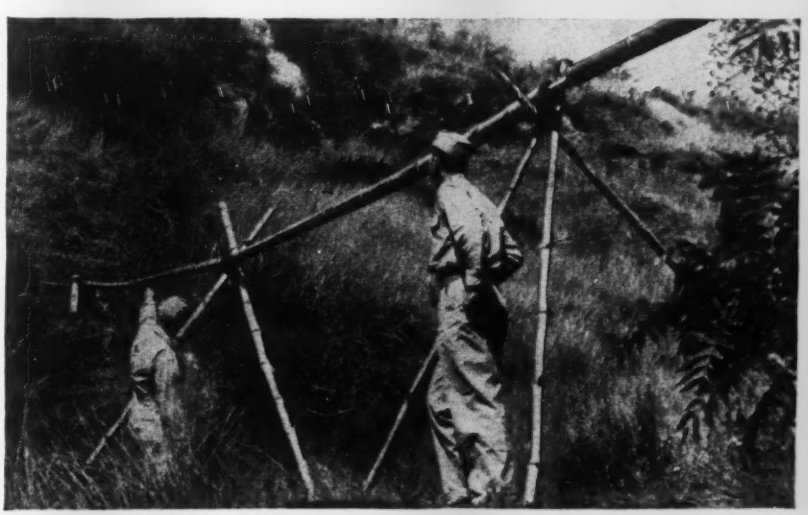
Mr. Johnson concluded by predicting that Mexico will provide an important market for sanitary equipment in the postwar era, and that the emphasis will be on the label "Made in the United States."

Bamboo is Substitute For Metal Water Pipe

In China, where metal pipe is extremely critical, the U. S. Engineers are finding bamboo a good substitute for small water supply lines. The accompanying photograph shows such a line 600 ft. long. It is appropriately named the "Bamboo Inch."

Used as a substitute for ¾-in. dia. pipe, the line was installed in a few hours by removing the joint piths in 15 to 20-ft. lengths of bamboo and joining the sections with short lengths of metal pipe. The ends were carefully reamed to fit and they were calked to make them watertight. A continuous flow of water fed by gravity prevents cracking of the bamboo, thus eliminating leaks.

It is to be noted that the supports for the line are also made of bamboo. The above description is an abstract of an item in the *Maintenance Engineer* published by War Plans Division, OCE, U. S. Army.



As a substitute for small-diameter metal pipe U. S. Engineers in China use bamboo poles from which the joint pith is removed.

Doubling the Capacity of a Water Plant

Kenneth Klaffke
Chief Draftsman, V. V. Long and Co., Consulting Engineers,
Oklahoma City, Okla.

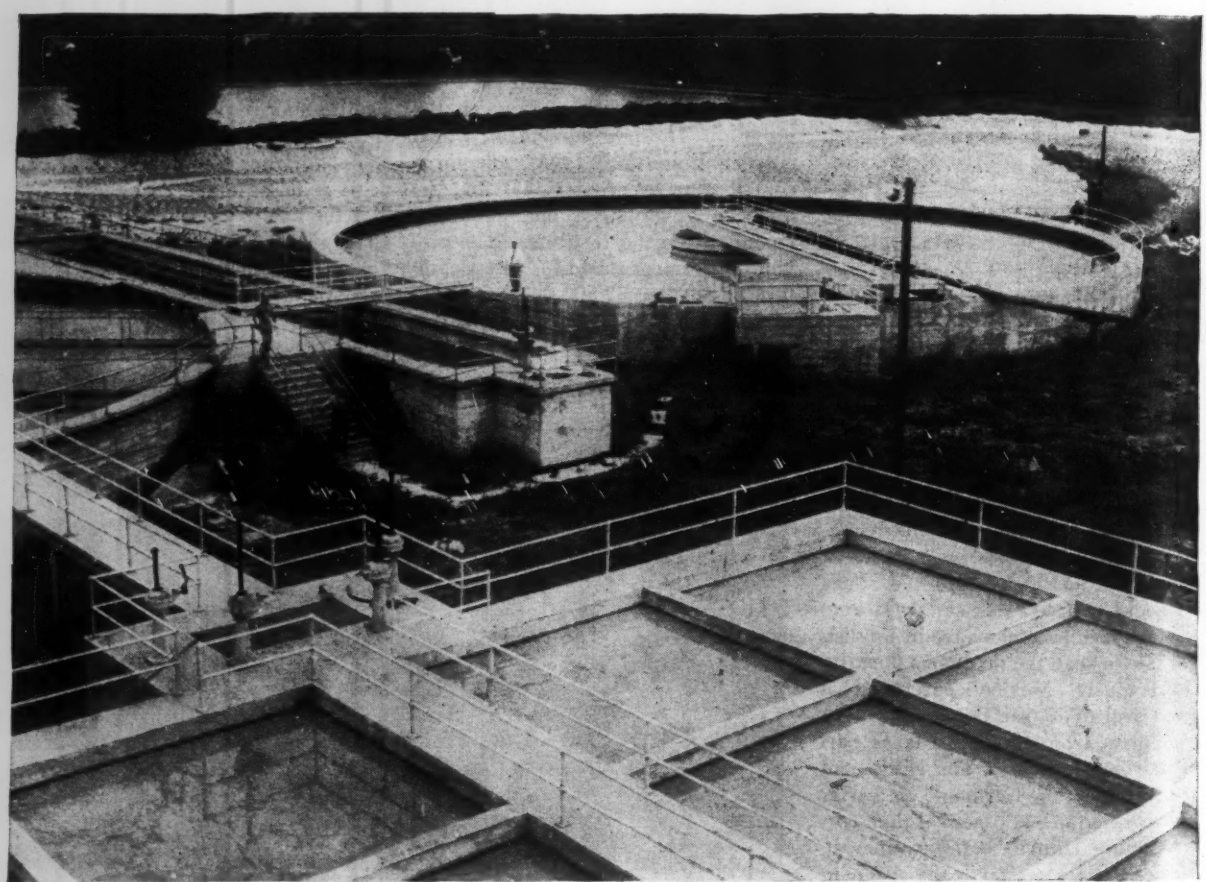
***Contents in Brief**—By installing pre-treatment facilities and other improvements, Oklahoma City has doubled the capacity of its existing water filtration plant without constructing additional filters. Efficient equipment and improved operation of the new plant made it possible to meet demands of 32 mgd. and also produce water of higher quality than heretofore obtained.*

WHEN IT BECOME NECESSARY recently to double the capacity of Oklahoma City's water softening and purification plant due to an unusually large increase in consumer demand resulting from the city's rapid growth, the most desirable plan provided for the installation of pre-treatment facilities to accelerate purification capacity without building additional rapid sand filters.

The original plant, most of which was built in 1922, had a normal capacity of 16 mgd., with a 22-mgd. maximum capacity. Its operation included aeration; treatment with chlorine, alum lime and carbon dioxide gas; mixing and flocculation in a baffle chamber; and filtration through eight 29-ft. by 24-ft. 8-in. rapid sand filters. To this original layout were added, in 1935, a 100-ft. dia. by 11-ft. side-water depth clarifier and a settling basin 165 ft. long, 120 ft. wide and 10 ft. deep. In the old plant, sludge from the clarifier was returned with an injector and mixed with the fresh lime slurry. The filter media was 24 in. of anthrafilt.

New facilities

Included among the new facilities which were installed a little over a year ago were provisions for auto-



ENR Staff Photos

Fig. 1. An additional clarifier and new flocculator basins are part of improvements to the Oklahoma City water plant.

matic proportioning during pre-chlorination, duplicate flash mixers and flocculators, a clarifier, a new carbon dioxide gas unit, a lime feeder and slaker, a dry chemical feeder and sludge pump. A new chemical house was constructed and the chemical handling equipment was rearranged more efficiently. A control board for filter operation by remote control also was furnished.

Installation of these pre-treatment units increased the normal capacity of the entire filtration plant from its original 16-mgd. capacity to 32 mgd. This corresponds closely with the maximum recorded daily raw water flow during the past year of 31.8 mgd. delivered through gravity flow conduits from Lake Overholser (the city's source of supply) when the lake was low.

Duplicate, automatic chlorine feed machines of 100- to 1,000-lb. per day capacity apply chlorine in the raw water line about 175 ft. (0.75 min. detention at 32 mgd. rate) ahead of the flash mixer. As the water enters the flash mixer, lime and returned sludge, alum and soda ash are added. Mixing of the water occurs in duplicate 12-ft. x 12-ft. x 14-ft. deep reinforced concrete mixing tanks by two 5-hp. propeller type, electric motor-driven flash mixers.

Detention time in each mixture is 4 min. at a 16-mgd. rate. The water then enters duplicate reinforced concrete flocculating tanks measuring 99 ft. long, 35 ft. wide and 14 ft. deep. Here the floc is kept in suspension by two 3-hp. motor-driven flocculating mechanisms. Detention time in each flocculator equals 30 min. at a 16-mgd. rate.

Parallel operation provided

All units are arranged for parallel operation and normally are operated so, although 30-mgd. rates have been handled through only one mixer and one flocculator.

From the flocculators the water flows into a common gate chamber, from which it is piped to the old and the new clarifiers. Both clarifiers are 100-ft. dia. reinforced concrete tanks with a one-hour detention period in each at a rate of 16 mgd. A carbon dioxide injection unit is located at the outlet of each clarifier. Water from the new clarifier and carbon dioxide unit flows directly to the filters while the water from the old clarifier passes through a settling tank with a two-hour detention period before reaching the filter.

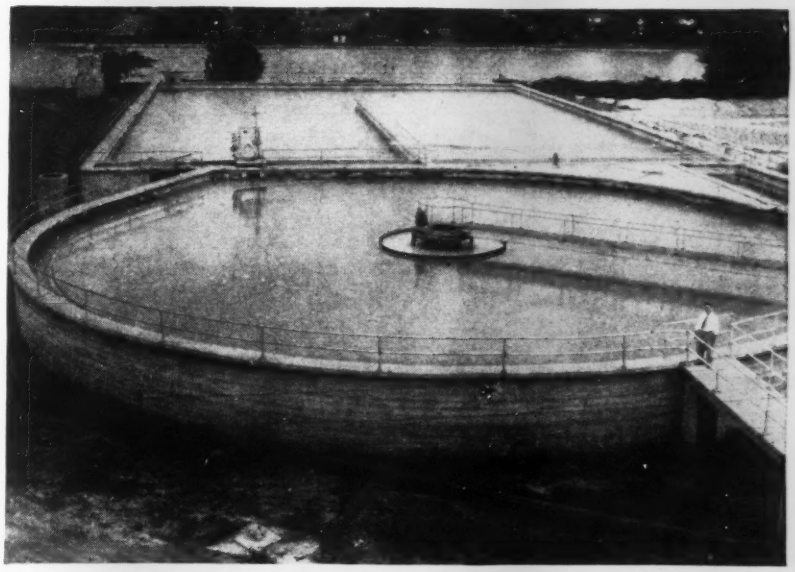


Fig. 2. Plant additions during 1935 included a clarifier and a settling basin.

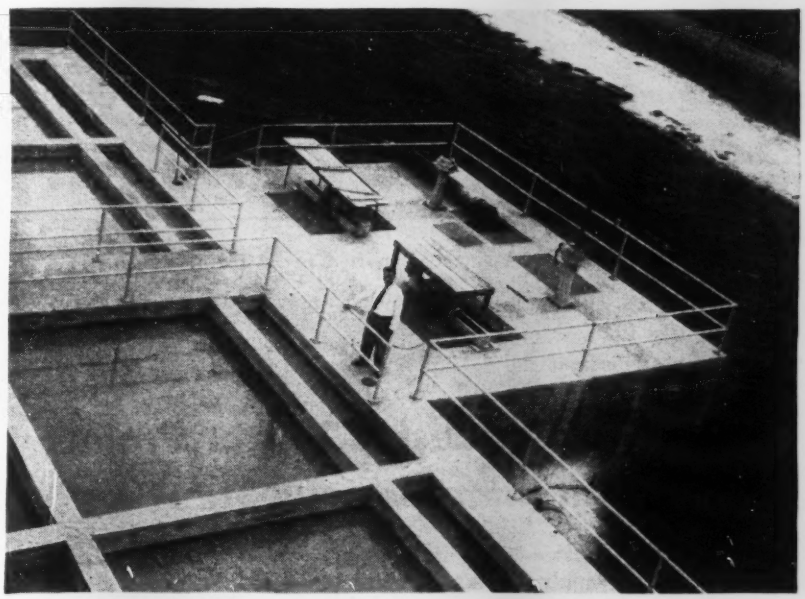


Fig. 3. Flash mixers were installed at the inlet end of the flocculator basins. Water enters the mixer along with lime, returned sludge, alum and soda ash.

New sludge pump

A variable-capacity sludge pump was installed to return sludge from the clarifiers to the flash mixers. It is located on the ground floor of the new chemical house with piping arranged for pumping from either clarifier to either of the flash mixers.

Although no additional filters were installed during the plant expansion, it was necessary to furnish larger-rate controllers for each existing filter. Following completion of the improvement, filters originally designed for 2 mgd. successfully filtered 4 mgd. each, at a total nominal capacity of 32 mgd. This equals 4 gal. per min. per sq. ft. with all eight of the 720-sq. ft. filters in operation.

Shortly after completion of the new water treatment facilities, the city replaced the old filter media with new

COMPARATIVE ANALYSIS OF RAW AND FILTERED WATER

(Month of July—p. p. m.)

		1941		1942		1943		1944	
		Raw	Filt'd.	Raw	Filt'd.	Raw	Filt'd.	Raw	Filt'd.
Total Alkalinity	Av.	147	31	140	27	140	33	145	40
	Max.	150	40	148	35	146	39	150	47
	Min.	143	24	136	20	133	26	140	33
Phenol Alkalinity	Av.		13		13		18		16
	Max.		28		25		25		27
	Min.		6		7		10		8
Non-carbonate Hardness	Av.	58	57	73	75	77	81	68	64
	Max.	80	68	84	82	84	94	80	80
	Min.	40	50	60	64	70	77	60	52
Magnesium	Av.	20	10	22	11	19	9	16	11
	Max.	22	11	26	16	26	12	18	14
	Min.	15	8	19	4	14	5	14	6
Turbidity	Av.	90		91		129		93	
	Max.	90		140		145		100	
	Min.	90		70		100		80	
Bacteria per c.c.	Av.	346	10	659	3.0	686	1.6	732	1.2
	Max.	2,500	34	3,000	24	2,800	9	1,080	4
	Min.	80	1	220	0	110	0	450	0
Temperature	Av.	81° F.		81° F.		81° F.		81° F.	
Ph	Av.					8.0	10.2	7.9	9.7
B.coli index/100 c.c.		14.9	0.64	80.7	0.06	40.0	0.0	24.2	0.0
Chlorine Residual	Av.				0.70		0.39		0.60
—Plant Tap	Max.				1.50				0.90
	Min.				0.03				0.39
Filter Runs (Hours)	Av.	58		65		30		40	
	Max.	66		99		62		57	
	Min.	51		36		8		15	
Alum. (lbs./mg.)		61		67.2		52.8		32.2	
Lime (lbs./mg.)		1,076–91.9% CaO		1,018–91.1% CaO		1,350–91.3% CaO		1,242–89.9% CaO	
Soda Ash (lbs./mg.)								81.3	
Calgon (lbs./mg.)						3.8		3.97	
Chlorine (lbs./mg.)		5.6		21.8		22.1		37.3	
Nat. gas for CO_2 cu.ft./mg.		1,111		1,374		1,145		962	
Percent wash water		1.3		0.94		2.57		1.39	
Total water treated		554.677 mg.		529.698 mg.		765.925 mg.		818.754 mg.	
Maximum day		23.635 mg.		22.88 mg.		30.16 mg.		31.74 mg.	

gravel and new anthrafilt. A surface wash system also was installed. The filter media now consists of 26 in. of 0.7 mm. and 4 in. of 3/32 to 3/16-in. anthrafilt. This material is supported in 12 in. of carefully graded gravel.

Chemical feed equipment now includes a gravimetric lime feeder and slaker, a gravimetric soda ash feeder, a volumetric alum feeder and a sta[r]by volumetric lime feeder and slak[er]. The city also has installed a sodi[um] hexametaphosphate feeder at the w[a]ter plant.

An interesting comparison of t[he] results of water treatment by the ne[w] and old methods is shown in t[he] accompanying table, which covers t[he] month of July, 1941 to 1944. Da[ta] shown for 1944 were obtained wh[en] the enlarged plant was in comple[te] operation. That for 1943 includ[es] operation of the old plant for part [of] the year prior to placing the add[i]tional facilities in operation.

It is to be noted that although th[e] total volume of water treated in Ju[ly] 1944 was 55 percent greater than fo[r] the same period in 1942, the relati[ve] amount of bacteria remaining in th[e] filtered water was considerably le[ss] during the latter period. Moreover, residual impurities in the filtere[d] water were, in general, no greate[r] during the periods of increased pumpage shown in the table.

Operating personnel

Operation of the plant is under the supervision of Frank S. Taylor, chief filtration engineer, reporting to M. B. Cunningham, superintendent, Oklahoma City Water Department. V. V. Long and Company, consulting engineers, designed the plant expansion and supervised its construction. Steve Pennington, contractor, Oklahoma City, performed the work.

Mexico City's Lerma Water Project Will Eliminate Serious Shortage

Fast-developing Mexico City has outgrown its water supply, but is taking interesting measures to remedy the situation.

Most of the city's present domestic supply comes from the springs of Xochimilco, famed for its floating gardens. That water system, when established in 1903, was based on an assumed population of 350,000. It was later extended and reinforced to provide for about twice that number. Today, however, the city's population is more than 2,000,000 and is growing rapidly.

To supplement the existing system some 80 artesian wells have been installed by apartment houses, hotels and other concerns. But this is still not enough, and in many parts of the city water is unavailable after 3 p. m. daily. Relief measures now under way seek to provide water not only for the present population but for one of 3,000,000 to 4,000,000 people, the assumed design flow being set at 220 mgd.

Aqueduct of non-critical materials

These measures include development of a new source of supply at Lake Lerma, some 32 mi. distant in the vicinity of Toluca, capital of the state of Mexico. Water from the lake and adjacent springs will be brought to Mexico City by a 32 mi. long aqueduct, 10 mi. of which is in rock tunnel through the mountains.

A striking feature of the aqueduct is that no critical materials and very little machinery are being used in its construction. Made of brick, stone and mortar, several long sections of the aqueduct have already been completed. Rapid progress is also being made on the tunnel from headings at four shafts. About 4,000 men are employed on the project.

Project financed from taxes

Another noteworthy feature in connection with this development is that it will be paid for in cash from tax collections, without resort to loans or bond issues.

Total cost of the project, which is expected to be completed in 1947 to provide 220 mgd. to the city, is estimated at $8,660,000. This figure includes the cost of regulatory dams and other appurtenant structures on the conduit line.

Precast Manholes and Multiple-Stem Valves Simplify Distribution System Operation

R. M. Dowe
Construction Engineer, Water Department, District of Columbia

***Contents in Brief**—In Washington, D. C., lightly reinforced 3-in. thick precast concrete rings are used to build the walls of water valve manholes. Manufactured at a central yard, the rings are readily installed by two men, thus permitting rapid work at low cost. For standardization and reduced maintenance charges 3- and 4-stem valves for 6- and 8-in. mains are manufactured by the water department. The use of these multiple-stem valves also permits better flow control and eliminates need for numerous manholes. Prison labor is used to make the rough castings for the valves, but all machine work is done by city employees using equipment required part time for other work.*

FOR MANY YEARS the water department of the District of Columbia has been constructing manholes of precast concrete rings manufactured on a mass production basis. Although this method is followed by few if any other cities in the United States, the procedure results in a number of major advantages. Water supply practice in Washington is further distinguished by the fact that the city is probably the only American municipality to use 3- and 4-stem valves. The valve castings are manufactured by prison labor, the machining and assembly being done by waterworks employees.

Manholes of precast sections were built in Washington before 1909. Up to this time brick manholes had been built, but in an attempt to reduce labor cost a few manholes were constructed of precast concrete rings. These proved so satisfactory that the design was adopted as standard.

Work since then has shown this method to have three major advantages. These are: (1) Method facilitates rapid construction and backfilling, which may be an important factor when city streets are torn up or a new line must be completed on a rush schedule; (2) cost is less than that for brick manholes; and (3) precast rings may be fabricated under controlled conditions at times when "fill-in" jobs are needed—for example, during bad weather. Also, older long-time employees may be used on the casting operations, although unable to do continued heavy work in the field.

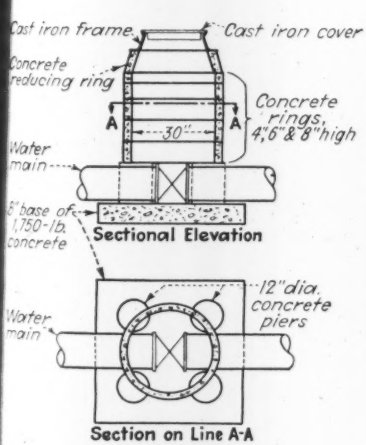


Fig. 1. Lower portion of vertical walls of manhole consists of four precast 12-in. dia. concrete piers and the upper portion is made of 3-in. thick precast rings of 30-in. inside diameter. Space between piers is filled in with earth backfill compacted in place. Right: A completed manhole ready for backfilling.

Manholes constructed of precast sections are used to accommodate vertical valves as large as 16 in. in diameter and all sizes of horizontal valves. When the latter type of valve is employed, one manhole is constructed over the main stem and another over the bypass.

A typical manhole is illustrated by Fig. 1. The base consists of an 8-in. concrete slab, generally about 4 ft. square and cast in place after the pipe is laid. On this base are placed four 12-in. dia. plain concrete piers or cylinders 15 in. high. If a main of diameter greater than 12 in. is to be accommodated, two tiers of cylinders are used. The space between these piers is closed with earth backfill compacted in place.

Three heights of rings used

Above the cylinders precast rings of 30-in. inside diameter and of 3-in. wall thickness are assembled. Three heights of rings are employed, 4, 6, and 8 in. On top of these rings an 8-in. high ring with the inside diameter reducing from 30 in. at the bottom to 24 in. at the top is added. Finally, a cast iron frame and cover is installed, both being of the same dimensions as those used for sewer work in Washington.

Use of rings of three heights permits the walls of the manholes to be built up to within 2 in. of any desired elevation. The rings are laid without mortar. If the manhole must be built

Fig. 2. Precast rings for manholes are manufactured with collapsible forms, in three sections. The inner form can be removed quickly by pulling the eye bolts used at two joints, the third joint being hinged.

to some exact height any necessary adjustment is made by constructing the uniform-diameter portion of the manhole a bit too low and then using brick to complete the wall before adding the reducing ring. However, the adjustment is required in but a small percentage of the installations.

The cylinders and rings are cast on the paved floor of a one-story timber-frame building by a crew of four men, older employees with long service records being assigned to this work (Fig. 2). Concrete is manufactured in a 2-bag mixer. Designed to give a compressive strength of 3,000 psi. at 28 days, the mix contains: Sand, 374 lb.; gravel, 661 lb.; ordinary portland cement, 188 lb.; and water, 12.5 gal. This mix results in a 5 to 6-in. slump, which is need to eliminate honeycombin... since rings are reinforced with a ring of gage, 3-in. mesh expanded me placed at the midpoint betw...en for

For casting the rings, both w... and cast iron forms are employe The inner form consists of three ... tions with bolted joints to permit removal, and the outer of two s... tions. The forms used for casting ... piers are very similar to those u... for making concrete test cylinders.

Concrete is placed in the forms shovel and wheelbarrow, and th... spaded in place. During the first ... hours of curing the sections are k... covered with wet burlap. After th... period the forms are removed a... the concrete cured at room temper... ture. Since the building may ... heated, it is possible to continue ca... ing operations in spite of co... weather. In view of this fact, wh... considerable new construction ... planned a large assortment of s... tions are cast during the winte... months.

Cost of the piers is $0.30 eac... while that for the rings varies fro... $0.75 for the 4-in. rings to $1.20 f... an 8-in. ring, including materials an... labor, but not overhead. The manho... frame and cover cost $10.80, bein... purchased from the District of Colum... bia penal institution. At this pric... the cylinders and rings permit ma... holes to be built at lower cost than ... constructed of brick. Moreover, rap... assembly is possible. Once the pip... has been laid and the base slab place... two laborers can easily complete ... manhole in about an hour, as th... rings are readily handled by the tw... men without hoisting equipment. Thi... time saving has proved of great ad... vantage.

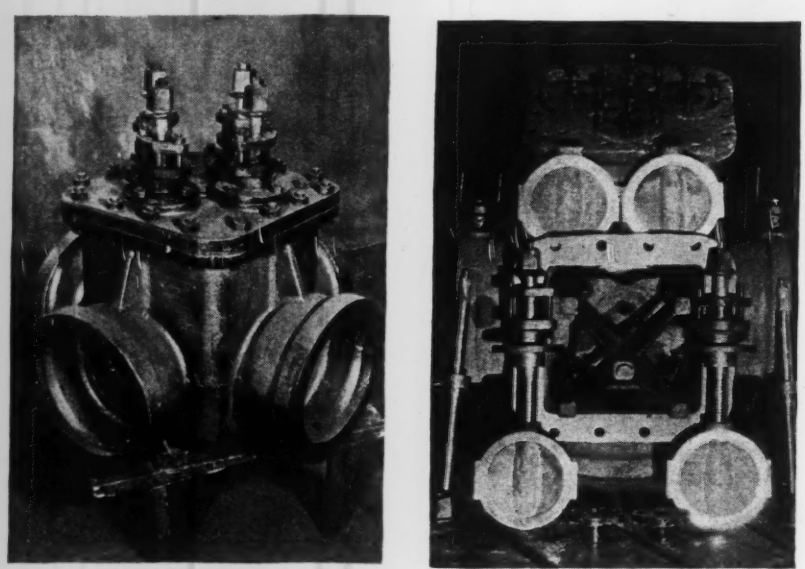


Fig. 3. Left: A completed 4-stem valve coated inside and out with asphaltic paint and ready for installation. Right: A disassembled 4-stem valve showing various parts.

Multiple valves are used

Work of the District of Columbi... Water Department is also characte... ized by the use of 3- and 4-stem valv... of a type exclusive to Washington, be... ing used so far as is known by n... other city in the world. The 4-ste... valve is especially adaptable to in... stallation in a grid distribution syste... where four lines intersect and it is de... sired to shut off flow in any "le... of the grid. This type of valve al... permits the supply to any given blo... to be shut off without interrupting de... livery to neighboring areas of th... distribution system.

By utilizing a 4-stem valve it is possible to use one valve and one manhole (Fig. 4) instead of four gate valves and an equal number of manholes. Although common practice in some cities is to install two gates and as many manholes at grid intersections, this layout does not provide flexibility equal to the 4-valve installation nor permit the isolation of all "legs" of the grid. The reduction in the required number of valves and manholes not only permits a large cost saving, but at intersections where subsurface space is at a premium the elimination of manholes is an important factor.

A somewhat different, although important, use for a 4-stem valve is illustrated by Fig. 5. This drawing shows a combination air vent, blowoff, fire hydrant connection and feeder main connection. Formerly it was more convenient for the department to connect blowoffs and air vents with sewers, but the more modern concept of public health standards has dictated abandonment of this practice. The drawing shows how the fire hydrant may be employed as an air vent and, with the aid of a small portable pump, as a blow-off outlet. Such a layout offers the added advantage of providing a supply to both the hydrant and feeder connection from each side of the gate valve. Many other installations of 4-stem valves permit flexibility equal to that shown in Fig. 5.

Use of the 3-stem valve accomplishes economies similar to the installation of the 4-stem design, but at 3-way intersections of mains. About twice as many triple-stem as 4-stem valves are installed. Parts for both types are completely interchangeable, except for the body castings. It is estimated that there are about 3,500 of these multiple-stem valves now in service in Washington.

Valves assembled by department

Another unusual practice of the Washington department is that of manufacturing 12-in. dia. and smaller valves needed for maintaining and enlarging the city's distribution system. The various types of valves manufactured by the city are listed in the accompanying table. The first valves were built by the department about 40 years ago, and since that time the practice has proven advantageous.

Advantages realized include:

COST OF BELL-END VALVES MANUFACTURED BY DISTRICT OF COLUMBIA WATER DEPARTMENT

Type of Valve	Cost
4-in., gate valve	$22
6-in., gate valve	28
6-in., 3-stem valve	75
6-in., 4-stem valve	80
8-in., gate valve	35
8-in., 3-stem valve	80
8-in., 4-stem valve	90
12-in., gate valve	60

Note: Cost indicated is for labor and materials only. It does not include overhead or capital charges.

Types of valves used are reduced to a minimum, simplifying maintenance and repairs and reducing the supply of extra valves and spare parts that must be kept on hand; (2) all valves of equal size are shut off with the same number of turns, eliminating damage to valves and uncertainty as to when a valve is completely closed or open; and (3) all valves are opened by turning in a clockwise direction, which avoids confusion as to whether a valve is being opened or closed.

Experience of the water department has revealed that the cost of valves manufactured by the city need not be prohibitive. Prison labor of low efficiency and paid by the day produces the rough body castings, bonnet tops, seat plates and body tops, while waterworks employees make all bronze parts, machine the rough castings and assemble the valves.

Equipment needed for other work

Only a small foundry is required at the prison to manufacture the rough castings, which is done without special work and will not be described in detail. Operations by the water department employees are carried out in a machine shop where several machines are employed in manufacture of the valves, but all of the equipment is also needed by the water department for operations other than valve manufacture.

The machines used are as follows: Large boring mill for boring out rough casting for seat rings, and machining this casting for the glands and stuffing boxes; lathe employed in making stems, collar rings and pipe collars and for machining gates; milling machine needed for machining gates and inner frames; and a drill press used to drill holes in bodies and covers, bonnet, inner frames and glands. This equipment is operated by six machinists.

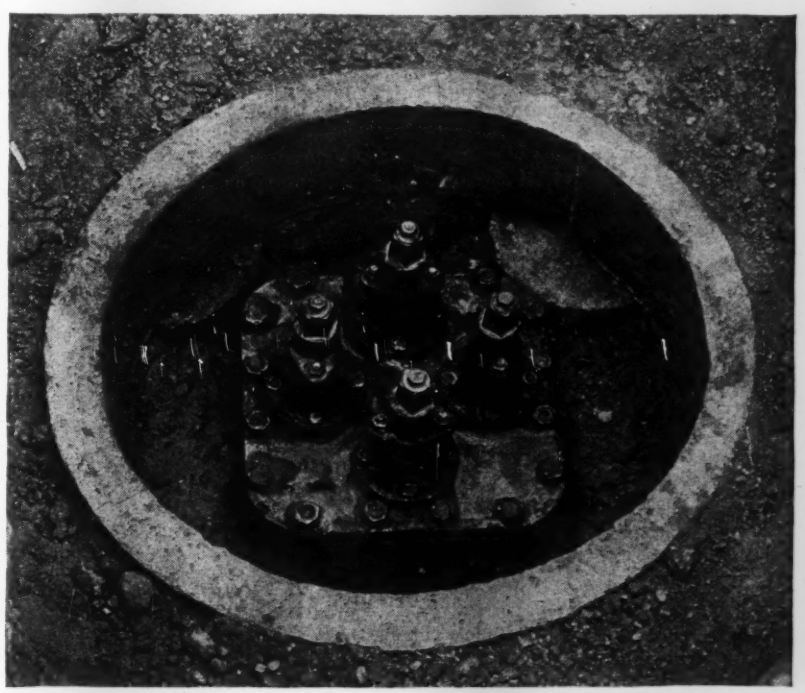


Fig. 4. One 4-stem valve with one manhole for servicing it conserves subsurface space in crowded intersections. Here shown is valve installed and first precast ring of manhole in place.

It should be pointed out that manufacture of the valves permits a maximum use of "fill-in" work for operators that must be employed full time.

Once a valve has been assembled it is tested under hydrostatic pressure. If no leaks develop, the outside is painted with a black asphaltic paint of the same type used to coat all the inner parts, excepting those of brass, before they are installed.

Cost of manufacturing the several different types of valves is shown in the accompanying table. This cost includes labor and materials but no overhead or capital charges.

Col. C. W. Kutz is engineer commissioner of the District of Columbia, Harold A. Kemp, director of sanitary engineering, and Humphrey Beckett, water department superintendent.

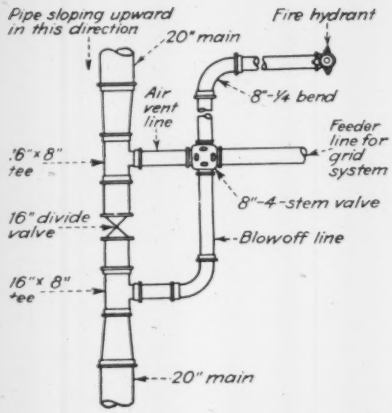


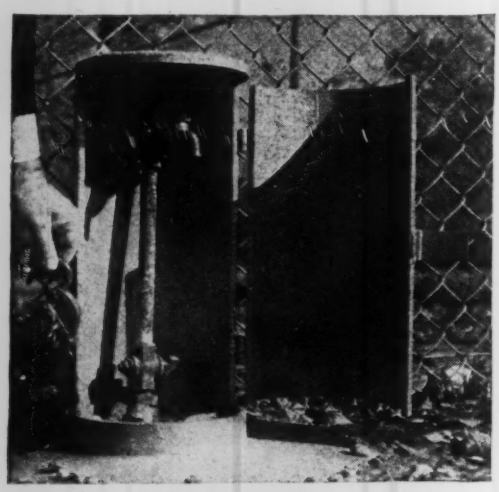
Fig. 5. Typical installation of 8-in. dia., 4-stem valve to provide an air vent, a blow off, a hydrant connection and a feeder connection between trunk main and grid system.

Tamper-Proof Housing for Water Sampling Tap

To simplify the task of getting water samples from various locations in the water distribution system, Los Angeles taps the desired main with a ½-in. riser pipe and faucet, both of which are enclosed in a tamper-proof housing. The latter is made from a piece of 8-in. steel pipe, as shown in the accompanying photographs.

The pipe, which is about 26 in. in length, is cut so that a 14-in. half section can be lifted out. Hinges are welded on one side of the half section so that it can be swung out, and a padlock hasp is welded on the opposite side. One end of the pipe is then closed by welding on a plate.

This assembly is then taken to the field, lowered over the riser and faucet, and embedded in grout. Access to the faucet can then be gained only by those who possess a key for the padlock. Advantages of this housing are that its speeds up sampling, eliminates the need for entering a customer's premises to obtain samples, and prevents possible contamination that might take place on a low and exposed outside faucet. About 30 housings of this type are used in Los Angeles, according to R. F. Goudey, sanitary engineer of the Department of Water and Power, who devised the housing.



Water sampling taps on the Los Angeles water distribution system are protected by sections of 8-in. steel pipe.

Sodium Silicate Finding Favor for Coagulation

Coagulant aids prepared from sodium silicate are being widely adopted at water treatment plants, according to H. R. Hay, of the Philadelphia Quartz Co.

For years St. Louis has used silicate treatment and the new Chicago South District filtration project, the world's largest purification plant, will soon go into operation using a silicate method developed by J. R. Baylis several years ago. (*ENR* June 18, 1942, vol. p. 1006). Ten plants in Florida are now utilizing sodium silicate in softening processes, and Des Moines, Iowa, obtains better iron removal from a silicate method.

The silicate coagulant aids produce a fast-forming, dense floc that settles rapidly, stated Mr. Hay. Their value in cold weather is of particular importance, and water of higher quality can be obtained. Plant capacity has been increased in both horizontal flow and up-flow types of filter designs. The beneficial effect of silicates can readily be determined by means of simple jar tests.

Contrary to previous fears, said Mr. Hay, it has now been established by the U. S. Bureau of Mines that the silicious types of sodium silicates do not cause intercrystalline cracking of boiler steel but tend to prevent it. This finding has encouraged the use of silicates for corrosion control and for internal boiler treatments. It has been found, however, that the silica coagulant aids are removed from the water by the floc and an additional application of sodium silicate is required for corrosion control or boiler treatment.

Four methods for preparing the coagulant aids exist, the choice of method depending on the plant treatment procedures, such as whether or not the addition of chloramines is desirable. The preparation of the coagulant aids has been simplified and several consultants are reported to be designing water plants specifically for the silicate treatments.

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

Biography of the Roeblings

BUILDERS OF THE BRIDGE—The Story of John Roebling and His Son. By D. B. Steinman. 457 pp. Harcourt, Brace and Co., New York 17. $3.50.

"Dedicated to the memory of The Builders of the Bridge that their unconquerable spirit may live as an enduring inspiration to The Builders of Tomorrow"—in the words of the author—this book presents the dramatic biography of John A. Roebling and his son, Washington A. Roebling, named pioneers in the field of suspension bridge design and construction. Enthusiastically told by one of the foremost suspension bridge engineers of today and based on authentic records, this story sketches the events of the 19th Century and their effect in developing the characters of the men whose careers were climaxed by the building of the Brooklyn Bridge.

John Roebling, fleeing Prussian oppression, came to Pennsylvania in 1831 at the age of 25 and founded a farming colony. However, his agricultural plans went astray and he returned to his profession of engineering. Then, his invention of wire rope in 1841 revolutionized not only his future but also that of suspension bridges.

After demonstrating what could be done with the new wire rope by building several suspension aqueducts, Roebling designed and erected the 820-ft. Niagara Railway Suspension Bridge, despite considerable public and professional skepticism. He was in his 61st year when the 1,057-ft. suspension bridge over the Ohio River at Cincinnati was completed after 11 years of heartbreaking labor. His son, Washington, who had risen to the rank of colonel in the Union army before joining his father on this project at the end of the Civil War, proved to be of great assistance in superintending the construction.

In the Brooklyn Bridge was Roebling's opportunity to build his dream span. All his life he had worked under high pressure, but he actually surpassed his accustomed fevered pace, as if racing with death, when he undertook to design this structure. However, he was not destined to win. A sudden accident took his life.

Well prepared by experience and training, Washington Roebling took over his father's task, until he fell victim to the bends, but although restricted to his bed and in pain, he continued to direct the work. The Master Builders paid heavily for their success—one gave his life, the other his health. But the bridge was built.

As told by Mr. Steinman, the story is tense, dramatic, fascinating. It should be as interesting to the engineer as to the layman, for it is filled with the lore of bridge building. It points out the lessons learned through experience by John Roebling and which modern bridge builders have allegedly forgotten.

Old Instructions for Surveys

ORIGINAL INSTRUCTIONS GOVERNING PUBLIC LAND SURVEYS 1815-1855—By J. S. Dodds, 215 pp. Published by Powers Press, Ames, Iowa. $4.

Professor Dodds has assembled in this book a large amount of material not otherwise available in printed form which should prove very helpful in interpreting original land surveys in the United States. Teachers of surveying also will find this work of great value as reference material for their students. In addition, engineers having no immediate interest in surveying work will find the publication interesting and instructive reading.

The book deals almost exclusively with the general government instructions governing public land surveys from 1815 to 1900. After briefly explaining the reason why errors and discrepancies occurred in old surveys, the author gives the instructions for U. S. land surveys previous to 1815, those commonly known as the "Tiffin" instructions. These are followed by the general instructions issued in 1831, 1834, 1843, 1846, 1850, 1851 and 1855. As each new set was issued more detailed instruction was provided, which is well illustrated by the fact that 170 pages are devoted to those of 1855 as compared to but a few pages for those of the first year mentioned. Comment by W. D. Jones, a Chicago surveyor, on the changes noted in the various sets of instructions and facts to be borne in mind when retracing and interpreting old surveys provides a good summary of the shortcomings of the different procedures recommended.

Contracts and Specifications

ENGINEERING CONTRACTS AND SPECIFICATIONS—By Robert W. Abbett, 188 pp. John Wiley & Sons, New York 16. $2.25.

Prepared primarily as a textbook, this small volume will be found useful by those concerned with preparation of contracts and specifications for buildings and heavy construction. The text includes a brief outline of legal considerations involved, an explanation of various forms of contracts and a description of kindred requirements such as insurance and bonds.

The book covers existing practice, including government cost-plus-fixed-fee contracts and provides specific examples of contract and specification forms applicable to both private and public works. Unique in books on this subject, the author refrains from making suggestions on revising contract and specification documents. Instead, the text and examples show what is the best of current practice with a few suggestions for avoiding ambiguous English.

New Vistas in Design

EXPERIMENTAL STRESS ANALYSIS—Proceedings of the Society for Experimental Stress Analysis, Vol. 1, No. 1, May, 1943, 156 pp., $3; Vol. 1, No. 2, Dec., 1943, 132 pp., $4; Vol. 2, No. 2, May, 1944, 225 pp., $5. Edited by C. Lipson, Chrysler Corp., and W. M. Murray, Massachusetts Institute of Technology, and published by Addison-Wesley Press, Cambridge, Mass.

Experimental stress analysis represents a new approach to problems of design that in the past were solved by tests to destruction. Interest in this subject has spread so rapidly that in 1943 a national organization was formed—the Society for Experimental Stress Analysis. The proceedings of this society include many papers that contain data of value to civil engineers.

For example, "Applications of Electric Measuring Equipment in

Railroad Research," by G. M. Magee and Randon Ferguson of the Association of American Railroads, describes measurements of stresses in rails, bridges and equipment. The use of electrical equipment for measuring strains is particularly valuable in railway work because the great variation in conditions of support and loading makes calculation of stresses extremely difficult. The ability to measure strains accurately under high speed operating conditions has opened up a broad field of opportunity for studying the requirements placed upon materials in actual service conditions as a guide to improvement in design or operation.

This paper is included in Vol. 2, No. 1, *Experimental Stress Analysis*. Also appearing in this volume are three papers respectively describing an electric, an electronic and a mechanical computer to convert strains into stresses. The need for this apparatus has arisen because the development of compact, reliable and inexpensive electrical resistance strain gages, along with improvements in associated amplifying and recording equipment: has made possible hundreds of strain measurements on structures undergoing static and dynamic tests, and this abundance of experimental data has created a new bottleneck; namely, the evaluation of strain gage measurements in terms of maximum and minimum stress and strain.

Another paper that should be of interest to civil engineers is "Model Analysis of Structures," by Charles H. Norris of M.I.T. in Vol. 1, No. 2, discussing methods most commonly used in the structural analysis laboratory at Massachusetts Institute of Technology and including details on procedures not widely known.

In Vol. 1, No. 1, a description of electrical instruments for strain analysis is given by Claude M. Hathaway of Hathaway Instrument Co. Included in this paper are discussions of electromagnetic strain gages and resistance strain gages, circuits for gages, control equipment, power-supply equipment and recording equipment. Also described are recent developments in industrial electronics that have resulted in simple and stable amplifying and control equipment suitable for field use and that have made it possible to use a relatively insensitive wire resistant gage.

Miscellaneous Notes on Booklets and Reprints

A REVISED READING LIST OF JUNIOR ENGINEERS has been issued by the Engineers' Council for Professional Development. Copies can be obtained from Miss Elsie Murray, Engineers Council for Professional Development, 33 West 39th St., New York 18, N. Y.

CONCRETE SPECIFICATIONS issued recently by the American Concrete Institute (New Center Bldg., Detroit 2, Mich.) include: ACI 613-44, Design of Concrete Mixes (50c.); ACI 614-44, Measuring, Mixing and Placing Concrete (50c.); ACI 617-44, Concrete Pavements and Bases (50c.); Air Entrainment in Concrete, a Symposium ($1.25).

STEPS IN SUCCESSFUL CONSTRUCTION are outlined in a "Memo to Management", latest booklet in a series prepared by the Southern California Chapter, Associated General Contractors of America, as part of its contribution to postwar planning. Copies are available from Frank J. Connolly, Manager, 707 Architects Building, Los Angeles 13, Calif.

"PROCEDURE FOR TESTING SOIL" is the title of a 200-p. pamphlet just issued by the American Society for Testing Materials, 260 S. Broad St., Philadelphia 2, to stimulate discussion of the suggested methods contained therein. At some date in the future the A.S.T.M. hopes to hold a symposium on this subject to aid Committee D-18 in the preparation of soil-testing standards for the A.S.T.M. Price $2.25 for single copies.

FLOOD FLOWS AND STAGES in Sacramento and Northern San Joaquin Valleys is the title of a compilation of records in which the Division of Water Resources, California Department of Public Works, presents descriptive and historical information on 105 stream gaging stations used for making flood stage magnitude measurements over a 12-yr. period. All available data are given on daily mean and crest flood flows and stages at these stations, together with an account of the functioning of the Sacramento River flood control project between the fall of 1942 and the spring of 1944. These reports are distributed to members of the engineering profession through the California State Library at Sacramento, Calif.

VARIED ACTIVITIES of the Ohio Department of Highways over the five-year period, 1939-43 are portrayed in an exceptionally readable style in "Ohio Ways", a 165-p. book issued recently. Well illustrated, the book is being distributed to schools and libraries to help develop public recognition of the important place held by adequate highways in the state's economic set-up. A limited number of copies are available to engineers from other highway departments from the Ohio Department of Highways' office at Columbus.

BOUND VOLUMES of back numbers of *Engineering News* for the years 1877, 1881 to 1886, 1888 and 1917 are available from the Sanitary Division, Public Works Department, Room 507, City Hall Annex, Boston; also back numbers of *Engineering Record* for the years 1899, 1900, 1904 and 1917, and *Engineering News-Record* for 1918, 1919 and 1937. George C. Benjamin, 852 Elm St., Manchester, N. Y., wishes to dispose of bound volues of *Engineering News* from 1886 to 1905 inclusive. The Mississippi River Commission, Vicksburg, Miss., is interested in obtaining back numbers of *Engineering News-Record* and its predecessors for years previous to 1927.

New Engineering Books

THE BUILDERS OF THE BRIDGE—The Story of John Roebling and His Son. By D. B. Steinman. 457 pp. Harcourt, Brace and Co., New York 17. $3.50.

ELEMENTARY SURVEYING, Eight Edition—By Charles B. Breed and George L. Hosmer. 717 pp. John Wiley & Sons, New York; Chapman & Hall, London. $4.

A GRAPHIC TABLE COMBINING LOGARITHMS AND ANTI-LOGARITHMS—Seventh Reprinting. By Adrien Lacroix and Charles L. Ragot. The Macmillan Co., New York. $1.75.

PROSPERITY, WE CAN HAVE IT IF WE WANT IT—By Murray Shields and Donald Woodward. 190 pp. McGraw-Hill Book, New York 18 and London. $2.

(*Continued on page* 172)

SUSTAINED CONSTRUCTION ACTIVITY

One Step Toward High Level Employment

IN the 34th editorial of this series, it was pointed out that sustained prosperity, based on high level employment, was a major postwar goal accepted by government, management and labor.

That editorial developed the theme that, if the goal were to be approached without undue sacrifice of our essential liberties, we must forego the search for magic panaceas, and follow the harder but more promising course of analyzing step by step, and industry by industry, the measures that might contribute toward the end sought.

This is the first of a number of editorials following such a particularized approach. It will examine the role of the construction industry in forwarding sustained prosperity.

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The influence of construction upon the general level of economic activity is important but not decisive. The claim is frequently advanced that major fluctuations of the business cycle might be ironed out by a properly devised and timed public works program; but any examination of the relatively modest contribution of construction activities to total national output will demonstrate its extravagance.

In the twenty years from 1920 through 1939, the value of new construction averaged just over 8½% of the gross national product. If we add repair and maintenance expenditures, the total is increased to a little over 12% of the gross product. But approximately two thirds of the construction of this period was privately initiated, and only one third was represented by government construction, federal, state and local combined. To expect that we can level out the peaks and valleys of our whole economy through manipulating the 4% portion that is represented by government construction is to expect a very small tail to wag a very large dog.

In fact, the record of construction activity in the past has been on the side of disequilibrium rather than stabilization. In boom times construction activity has climbed to relatively higher peaks than those reached by the economy as a whole; in depression periods it has fallen to deeper troughs. Aside from the special work relief program of the depression thirties, the performance of public construction in this respect is little better than that of private. New government construction mounted with the general trend of the boom from 1921 to 1929, thereby adding its weight to the inflationary trend.

Instead, then, of expecting the construction industry to stabilize our whole economy—a task clearly beyond its power—it would seem appropriate to ask that it look to the more attainable goal of leveling out its own violent fluctuations. If this can be done, many of the most vexing problems of the construction field and of its sphere of influence will be mitigated, employment will be regularized in one important segment of industry where the past record has been particularly uneven, and one aggravating contribution to general business instability will be removed.

The achievement of these highly important, if limited, aims will require the thoughtful, vigorous, and concerted cooperation of management and labor in the construction industry, of a variety of governmental agencies, and of those who direct the sources of construction credit. Of the many measures that must be woven into an ordered program, it is practicable here to present only the broad outline of those which seem to offer the greatest potential usefulness.

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1. Stabilization implies the holding of a balance rather than a freezing at a given level. No rigid formula for a most desirable level of construction activity is possible or desirable. However, it may be accepted as a reasonable initial premise, that we could sustain in the future without major distortion something like the 12% ratio of total construction to gross national product that has been approximated in the past. If it is to serve as an useful reference point, such a generalized premise must be subjected to constant testing both nationally and locally. There must be careful and continuous scrutiny for signs of demand saturation, cost inflation, and labor shortages, all danger signals of far greater reliability than any percentage formula.

The first requisite then is the general availability of information along such lines, far more complete and current than has hitherto been at hand. The second is a general will to hold building activity at a level as high as but not higher than we probably can sustain. Once this principle is accepted, the problem becomes one of marshalling all available instrumentalities to forward it.

2. Public construction, although too small to exert a decisive influence upon economic activity as a whole, can

condition construction trends to a major degree. If, in the decade following the war, government construction approximates its 1920 to 1940 average of one third of all construction, its properly timed impact could do much to level out the construction cycle.

To do this most effectively, public construction should be deferred where and when private building is going forward at a satisfactory pace, and should be started when and where private activity shows undue slack. All government construction does not lend itself to such adjustment. But a large portion of it could be held up for the three to five years which, upon past experience, would provide the necessary leeway to counteract the more violent fluctuations in private building.

Such a program presents numerous difficulties both political and administrative. None should be insurmountable, and the results promise to be of sufficient moment to justify the extraordinary effort that would be required to coordinate federal, state and local government programs. Here is an excellent forum for testing whether or not government economic activity can be made to supplement rather than supplant private effort to serve ends upon which all are agreed.

3. Since private building, postwar as in the past, must supply the preponderant share of construction activity and employment, costs will continue to play a dominant role in determining levels of operation. Wartime restrictions have created formidable backlogs of deferred demand for most types of private, and for many of public, construction. Such demand is so great that it almost certainly will provide the impetus for a postwar building boom of several years duration. There is considerable doubt that in the beginning our building trades, dislocated by war and at low ebb, can organize rapidly enough to carry their share of the anticipated general advance.

However, if former patterns hold, building activity, after a lagging start, will soar, costs will mount, and eventually will saturate effective demand with resultant collapse. That, of course, is precisely the sort of a situation we are seeking to avoid. Crucial to this end is the prevention of rising costs or, better still, the reduction of building costs from present swollen levels.

A recent study by technicians of the War Production Board on the outlook for private housing construction illustrates the point. From 1900 to 1940 the number of housing units built in this country closely matched the statistics of new family formation. The former ran considerably ahead of the latter from 1920 to 1929, and fell behind by the same margin in the following decade.

If the market for new houses were to be similarly limited for the period from 1940 through 1949, the effective demand for new housing during the last five years (1945-1949) is estimated at 3,000,000 units. That is after allowing for houses built from 1940 through 1944, and for vacancies, demolitions, and other factors. If, however, prices could be reduced to 1939 levels, the 3,000,000 unit demand is estimated as increasing to more than 7,000,000 units. Since the latter figure is substantially beyond our production capacity for the period, a backlog would be created that would support an effective sustained demand for the subsequent decade (1950-1959) of 1,000,000 units per year, as against half that amount if rents and sales prices mount with increasing incomes.

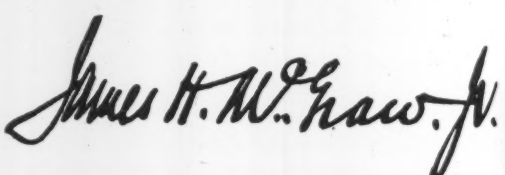
The precise accuracy of such an estimate may well be questioned. There can be no question as to the general validity of the point illustrated. The progressive lowering of construction costs will stimulate demand in this field as it has in others. Building management, labor, and their suppliers and customers stand to gain from such a result. Unnecessary restrictions against the adoption of improved technologies and increased productivity should, therefore, be removed, whether imposed by codes of government, regulations of unions, collusion of managements, or inertia of workers. Unless there are compelling social justifications such restrictions must be judged harmful to the whole economy.

4. Numerous other measures could contribute substantially to increased and increasingly stable construction activities. Space remains only to stress the importance of careful consideration for the use of credit facilities as a means of stabilization. In recent years the establishment of the Federal Housing Administration provided a needed stimulus to mortgage lending in the field of housing. The modern pattern of long-term mortgages, providing for regular amortization as well as interest, should be a steadying factor in periods of liquidation. However, there appear to be further possibilities for using credit facilities as a brake when construction activity threatens to climb beyond a level that can be sustained. If public and private lending agencies could devise sound means for raising mortgage rates, increasing down-payment requirements, shortening amortization periods and basing value appraisals upon normal rather than inflated costs, they might exert a healthy influence against the tendency of the construction bubble to inflate until it bursts.

☆ ☆ ☆

There is no royal road to sustained high level employment. There is not even a single path to assured construction stability—there are many paths, all strait and narrow and all paved with bruising cobbles. This is true for all other major segments of industry.

It is easier to seize upon a magic formula such as monetary control, or deficit spending, or any one of a score of others, than to undertake an intricate task of piecemeal exploration. But only the latter course will lead to prosperity.



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CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

WAREHOUSES, ETC., RENTON, WASH.

OWNER: U. S. Engineer Office, Seattle, Wash.

PROJECT: Construction of two frame warehouses, each 200 x 825-ft., at the plant of the Boeing Aircraft Co., Renton, Wash. Project involves construction of rail spurs, sanitary and storm sewers, paving, and water supply system. Warehouses are of wood frame construction with timber piling foundations.

CONDITIONS: Rail, highway and water transportation facilities available to project site. Contractor to complete work in 130 days. Wage rates are: skilled labor, $1.545 to $2.00 per hour; semi-skilled, $1.145 to $1.495; and common, $1.145.

BIDS: Six bids were received February 26, 1945, ranging from the contract low of $666,723 to $879,715.

LIST OF BIDDERS:

1. A. F. Mowat Constr. Co. and John H. Sellen Constr. Co., Seattle, Wash. (contract) $666,723
2. Sound Constr. & Engr. Co., Seattle, Wash. 696,141
3. Boespflug Constr. Co., Seattle, Wash. 728,595
4. A. W. Johnson Co., Seattle, Wash. 739,897
5. General Construction Co., Seattle, Wash. 771,972
6. George Teufel, Seattle, Wash. 879,715

Item	Quan.	Unit Prices (1)	(2)	(3)
Warehouse Structures				
1. Clearing site	Lump Sum	$1,575.00	$3,000.00	$1,100.00
2. Break and remove concrete	1,700 s. y.	.63	.30	.60
3. Common excavation	20,300 c. y.	.55	.58	.82
4. Structural excavation	15,000 c. y.	1.32	.74	1.50
5. Imported pit run fill and bkfill. material	17,700 c. y.	.84	.80	.90
6. Crushed stone base course	15,000 ton	2.26	3.35	2.60
7. Structural concrete	1,730 c. y.	19.20	21.00	16.75
8. Furn. treated timber piling	300 l. f.	.75	1.15	.60
9. Drive timber piles	16 ea.	40.00	38.00	45.00
10. Warehouse and shed (wood trusses)	Lump Sum	336,027.00	336,559.00	368,897.00
11. Automatic sprinkler system	Lump Sum	52,392.15	53,412.00	53,025.00
12. Sprinkler supervisory alarm sys.	Lump Sum	20,620.00	20,620.00	21,798.00
13. Watch, report and fire alarm sys.	Lump Sum	6,262.00	6,259.00	6,616.00
14. Ext. electric work	Lump Sum	7,054.00	7,050.00	7,452.00
15. Fence, type FEN-C-M	2,003 l. f.	.74	.12	1.00
16. Relocate existing fence	695 l. f.	1.82	.23	1.90
17. Four-foot gate	1 ea.	22.00	12.00	50.00
18. 20-ft. gate	2 ea.	150.00	35.00	180.00
19. 56-ft. gate	1 ea.	600.00	90.00	630.00
20. Relocate one guard office	Lump Sum	600.00	420.00	996.00
Pavement				
21. Conc. paving slab outside bldg. (6-in. thickness; thickened edges)	18,700 s. y.	2.05	2.83	2.75
22. Prime coat, MC-2	7 ton	36.75	43.00	40.00
23. Plant-mix bitum. surfacing	1,900 ton	5.70	5.75	6.00
24. Asphalt cement in plant mix (121-150)	95 ton	30.00	30.00	31.00
25. Seal coat, RC-2	5 ton	35.00	38.00	40.00
26. Cover aggregate for seal coat	45 ton	4.00	3.80	4.00
Railroad				
27. Railroad track	5,125 l. f.	1.36	3.25	1.40
28. Turnouts	4 ea.	237.00	325.00	200.00
29. Double crossovers, incl. grade crossing planking	2 ea.	450.00	800.00	415.00
30. Ballast	550 ton	2.52	1.55	2.65
31. Williams St. grade crossing	Lump Sum	650.00	345.00	500.00
32. 8th Avenue grade crossing (incl. removing culvert)	Lump Sum	375.00	290.00	300.00
33. Grade crossing planking	1,800 l. f.	.75	.80	.11
34. Bumpers	4 ea.	30.00	4.00	35.00
Culverts				
35. 12-in. rein. concrete culv. pipe	27 l. f.	2.03	2.03	2.15
36. 12-in. ext. str. r. c. culv. pipe	162 l. f.	2.03	2.03	2.15
37. 18-in rein. conc. culv. pipe	141 l. f.	3.02	3.03	3.20
Water Supply System				
38. 8-in. cast iron watermain	4,500 l. f.	2.39	2.39	2.50
39. 6-in. cast iron watermain	1,000 l. f.	1.73	1.73	1.83
40. 4-in. cast iron watermain	180 l. f.	1.27	1.27	1.35
41. 2½-in. wr. iron or steel water line	40 l. f.	1.00	1.00	1.05
42. 2-in. as above	185 l. f.	.79	.80	.83
43. 1½-in. as above	110 l. f.	.74	.74	.80
44. 8-in. gate valves and valve boxes	14 ea.	70.35	70.35	74.00
45. 8-in. gate valve with indicator post	8 ea.	115.50	115.50	122.00
46. 6-in. gate valve and valve boxes	3 ea.	48.30	48.30	51.45
47. 4-in. gate valve and valve boxes	6 ea.	34.65	34.65	36.80
48. 2½-in. gate valve and valve box	1 ea.	27.30	27.30	30.00
49. 2-in. gate valve and valve box	3 ea.	23.10	23.10	25.00
50. 1½-in. gate valve and valve box	3 ea.	17.33	17.35	20.00
51. Fire hydrant	8 ea.	105.00	105.00	110.00
52. Relocate existing fire hydrant	1 ea.	26.25	26.25	30.00
53. Protective posts for hydrants and post indicator valves	36 ea.	6.30	6.30	6.80
Sanitary Sewer System				
54. 8-in. sanitary sewer pipe	2,000 l. f.	1.37	1.37	1.45
55. 6-in. sanitary sewer pipe	50 l. f.	1.08	1.08	1.40
56. Special pipe encasement under RR	40 l. f.	4.20	4.20	4.45
57. Sanitary sewer manholes (over 4-ft.)	4 ea.	105.00	105.00	110.00
58. Sanitary sewer shallow manholes (under 4-ft. depth)	9 ea.	89.25	89.25	94.00
Storm Drainage System				
59. 30-in. rein. concrete pipe	150 l. f.	6.06	6.06	6.45
60. 18-in. rein. concrete pipe	2,425 l. f.	3.02	3.02	3.20
61. 18-in. ext. str. rein. conc. pipe	890 l. f.	3.57	3.57	3.75
62. 12-in. ext. str. rein. conc. pipe	1,400 l. f.	1.87	1.87	1.85
63. 6-in. concrete pipe	2,540 l. f.	.92	.92	1.00
64. 8-in. open joint pipe	570 l. f.	1.10	1.10	1.15
65. 6-in. open joint pipe	1,410 l. f.	.92	.92	1.00
66. Paved drainage ditch, complete with parking bull rails	1,240 l. f.	.45	.70	.75
67. Plug two existing drainage pipes	2 ea.	10.50	10.50	15.00
68. Storm drainage manholes	15 ea.	105.00	105.00	111.00
69. Storm drainage inlet manholes	24 ea.	84.00	84.00	88.00
70. Type I inlets	18 ea.	52.50	52.50	55.00
71. Type II inlets	8 ea.	63.00	63.00	66.00
72. Type III inlets	2 ea.	68.25	68.25	70.00
73. Outfall structure, incl. pipe cradles	Lump Sum	315.00	68.25	300.00

VIADUCT, TACOMA, WASH.

OWNER: City of Tacoma, Wash., Burwell Bantz, city engr.

PROJECT: Construction of continuous, reinforced concrete, cellular-type girder viaduct on East 30th Street, East A to East B Street, in Tacoma, Wash. Overall length 320 ft., 305 ft. between abutments. In addition to the bridge structure, project includes removal of old structure, removal of old pavement, necessary excavation including backfill, cement concrete pavement, sidewalk and curb.

CONDITIONS: Contractor to furnish all material and complete work in 150 days. An existing timber trestle at the project site is being used for false-work. Rail, highway and water transportation facilities available. Wage rates are: skilled labor, $1.595 to $1.745 per hour; semi-skilled, $1.145 to $1.395; and common, $1.145.

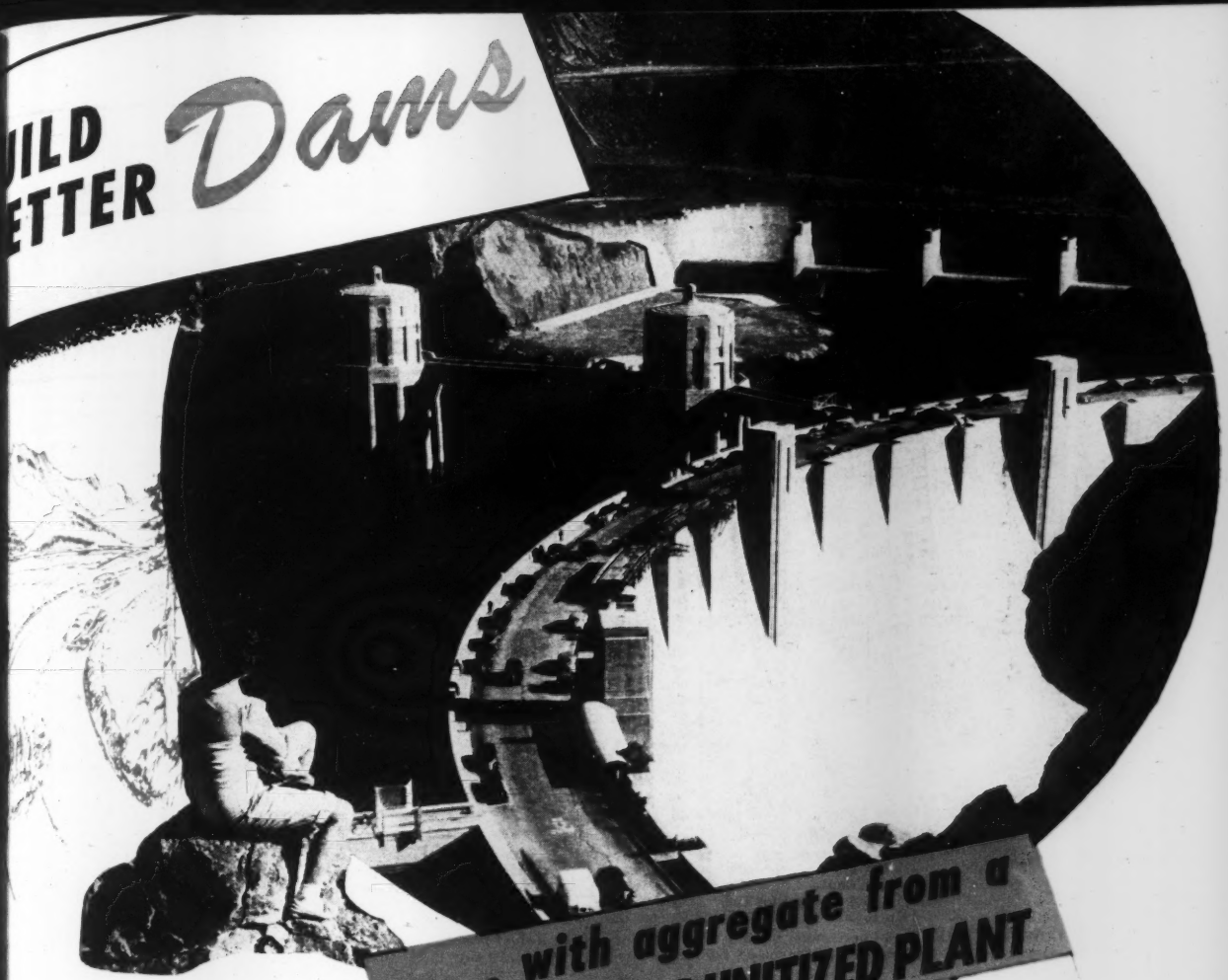
BIDS: Eight bids were received February 14, 1945, ranging from the contract low of $52,889 to $69,778.

PARTIAL LIST OF BIDDERS:

1. Rumsey & Co., Seattle, Wash. (contract) $52,889
2. S. R. Gray & Son, Puyallup, Wash. 56,088
3. McKellar & Payne, Morton, Wash. 57,999

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Remove old structure	Lump Sum	$2,500.00	$750.00	$1,500.00
2. Remove old pavement	40 s. y.	1.00	2.00	2.50
3. Struct. excav., incl. backfilling	442 c. y.	6.00	10.00	9.00
4. Class A concrete	668 c. y.	42.00	40.00	45.00
5. Class B concrete	144 c. y.	30.00	40.00	45.00
6. Class G concrete	54 c. y.	24.00	40.00	42.00
7. Steel reinforcing bars	182,990 lb.	.055	.06	.055
8. Structural steel	2,051 lb.	.25	.40	.25
9. Bearing rollers	Lump Sum	200.00	200.00	100.00
10. Reinforced conc. bridge railing	649 l. f.	4.50	6.00	4.00
11. Gravel backfill	25 c. y.	3.00	2.00	2.00
12. One-course conc. sidewalk (std. 14-day mix)	115 s. f.	.25	.40	.50
13. Cement conc. pavement (std. 14-day mix)	40 s. y.	4.00	4.00	4.00
14. Integral concrete curb	32 l. f.	2.00	1.50	2.00

ILD ETTER Dams



. . . with aggregate from a CEDARAPIDS UNITIZED PLANT

those big jobs where tonnage of ggregates runs into the hundreds usands, the difference of a few per ton in production cost may rofit or loss to the contractor. That's the big Cedarapids Unitized Plant high capacity and low operating costs dividends.

super crushing plant handles material ontinuous flow from quarried rock to y trucks at the rate of 150 to 200 tons ur. The big primary with its 1000 sq. in. ening sets the pace for the entire plant tak- e biggest rock with ease. A smaller jaw and roll crusher in the secondary unit then the oversize to the wide range of sizes to meet regate specifications. Each unit is mounted on a atic-tired truck ready to attach to a truck- . Costly dismantling and erecting time have liminated so idle time is kept to the minimum.

ready for those BIG postwar jobs now. With a pids Unitized Plant to produce the aggregate est cost you'll be sure of getting your share.

WA MANUFACTURING CO.
Cedar Rapids, Iowa

THE IOWA LINE
of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS
STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS—TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

MAY PRICES in the construction field show only minor changes from the preceding month according to reports from 20 cities to *Engineering News-Record*. In Pittsburgh cement is up 5c. per barrel and sand is off 20c. per ton in Detroit for the only changes in the cement, aggregate and ready-mixed concrete price table.

Paving brick increased $1.00 per M in Pittsburgh, and structural clay tile is higher there. The tile prices are also up in Detroit. Common brick climbed in Kansas City, as did paving brick. Lumber prices are unchanged from the preceding month, but pine prices are higher on some sizes in the New York shipping areas on pine and on fir.

The structural ironworkers' rate in Boston increased 2½c. from $1.[illegible] to $1.[illegible] The common labor rates for building and for heavy construction both are [illegible] hour in Pittsburgh, the former climbing to $1.00 and the latter to 90c.

CEMENT, AGGREGATE, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT — Per bbl., C/L lots, incl. 40c. per bbl. for bags, cash dis. not deducted			SAND AND GRAVEL — Per ton, carload lots			CRUSHED STONE — Per ton, carload lots		CRUSHED SLAG — Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8x8x16-in.; truckload del.; per block		CONCRETE Ready Mixed 1:2:4, over
	Cloth *a*	Paper	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand-grav. Lt.wgt. Agg.		50 c.y., f.o.b.
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$0.17	....	$8.00
Baltimore	2.62	2.37	2.12	1.80‡	1.80‡	1.30‡	1.80‡	1.80‡	1.75‡	1.75‡	.125	$0.125*w*	7.45
Birmingham	2.50	2.25	2.10	1.75	1.75	1.50	.85	1.00	.90	1.15	.1425	....	5.80
Boston	2.97*b*	2.72*b*	2.52	1.50‡	1.50‡	1.05‡	1.25‡	1.35‡	....	....	.13	.155*w*	7.55*m*
Chicago	2.90	2.65	2.50	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	.16	.16*x*	....
Cincinnati	2.41	2.16	1.96	1.20	1.20	1.10	1.80	1.80	....	....	.12	.15*w*	6.70
Cleveland	2.49	2.24	....	1.75*i*	1.75*i*	1.55*i*	1.80*i*	1.80*i*	1.73‡*i*	1.73‡*i*	.14	.14	7.45
Dallas	2.51	2.26	2.06	1.50*p*	1.70*p*	1.10*p*	1.69*p*	1.79*p*	....	....	.15	....	7.15
Denver	3.08	2.88	2.32	1.20	1.30	1.25	1.65	1.75	1.00	1.00	.15	....	7.25
Detroit	2.49	2.24	2.09	1.50	1.50	1.30	2.25	2.25	2.00‡	2.00‡	.13	.14*w*	7.15
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	.125	.125*w,z*	7.50*n*
Los Angeles	3.20	2.60*e*	....	1.30	1.30	1.15	1.30*f*	1.30*f*	....	....	.04*bb*	.10*aa*	7.50
Minneapolis	3.07	2.82	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	.12	.16	7.55*g*
Montreal	....	1.95*rs*	1.79*rs*	1.65‡*s*	1.65‡*s*	1.50*t*	.80*ct*	.90*ct*	....	....	.14*t*	.14*wt*	7.85*t*
New Orleans	2.42	2.16	1.96	1.67	1.65	1.22	....	....	.90	1.15	.19	....	9.25
New York	2.85‡	2.60‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	.16	.14*wcc*	7.50*n*
Philadelphia	2.73	2.48	2.28	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	.155	.155*w*	8.45
Pittsburgh	2.70	2.45	2.25	1.65‡	1.65‡	1.85‡	2.25‡	2.25‡	1.50	1.50	.17	.17*z*	8.40
St. Louis	3.08	2.80	....	1.75‡	1.75‡	1.25/1.50‡	1.10*h*	1.10*h*	.90*g*	1.15*g*	.145	.13*w*	8.25
San Francisco	2.21	2.01	1.71	1.36	1.36	1.36	1.46	1.46	....	....	....	.21*y*	7.35
Seattle	....*u*	3.00*o*	....	2.35*dt*‡	2.35*dt*‡	2.35*dt*‡	2.00*o*	2.00*o*	....	....	.16	.16*y*	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* F.o.b. quarry. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 2 percent for each in 10 days. *l* Up to 200 cu. yd. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u* Withdrawn. *v* 20c. per bbl. discount; 20c. allowed for returnable cloth bag. *w* Cinder. *x* Waylite. *y* Haydite. *z* Colored. *aa* Pumice. *bb* 4 x 8 x 12 in. *cc* Also 8 x 18 x 18 in.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICE BASES AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk
Buffington, Ind	$1.90	$1.85
Dallas, Tex	....	....
Hannibal, Mo	1.90	1.85
Hudson, N. Y	....	....
Independence, Kans	1.70	1.65
Ironton, Ohio	$1.70	$1.65
Limedale, Ind	....	....
Norfolk, Va	....	....
Northampton, Pa	1.75	1.70
North Birmingham, Ala	....	....
Richard City, Tenn	$1.80	$1.7
Steelton, Minn	2.00	1.9
Universal, Pa	1.75	1.7
Waco, Tex. (Plus 9c. tax in Tex.)	1.75	1.7
Montreal (8% sales tax incl.)	1.68	1.6

Discount 10c. per bbl. 20 days

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICK AND BLOCK			PAVING ASPHALT — Per ton, less than 80 penetration		ASPHALT BINDERS—FLUXES — Per gal., 80–300 penetration		CUTBACK ASPHALT — Per ton		ROAD OIL — Per gal.	ASPHALT EMULSION (Quick-breaking) Per gal.	
	Granite per M lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in. carload lots	Wood per sq. 6d. 3½ in. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.53*e*	.....†	$0.0740*e*	.....†	$0.086*he*	.....†	$0.0781*e*	$0.0806	....
Baltimore	150.00‡	49.00	85.00*m*	15.00*r*	21.00*r*	.06*r*	.09*r*	13.00*r*	23.00*r*	.065*r*	.07*r*	.1[illegible]
Birmingham	150.00	48.00	.....	17.95	.....†	.0747	.....†	.0834*h*	.....†	.065	.095	....
Boston	85.00	59.00	3.75	15.00	24.00	.0625	.115	17.00	30.00	.0625	.0825	.145
Chicago	150.00	55.00	2.50/2.80*d*	14.00	22.50	13.00*g*	21.50*g*	.0575*h*	.15*h*	.05*n*	.09/.10*n*	.13/.18*n*
Cincinnati	120.00	53.75	.....	17.00	.....	.085	.....	12.25	.....	.07	.085	....
Cleveland	126.00	37.25	3.37*l*	17.00	19.00	.085	.095	.10*h*	.11	.08	.10	....
Dallas	.....	36.00	.....	13.65	20.30	.06	.11	16.00	24.80	.06	.05/.07	.07/.09
Denver	.....	16.11	.....	11.00	.....	10.00	.....	.045*h*	.....	.....	.....	.....
Detroit	.....	37.00	.....	18.06*f*	25.60*f*	.0743	.128	.0718*h*	.119*h*	.067	.0775	.149
Kansas City	.....	44.00	.....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
Los Angeles	.....	50.00	.....	9.00*b*	23.00	9.50*bq*	24.00*bq*	9.50*b*	.....	.025	.072	.15
Minneapolis	.....	.....	2.30*d*	.....	27.70	.....	.126	.....	36.64	.....	.....	.....
Montreal	92.40	.....	.....	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	.188*k*
New Orleans	.....	.....	.....	13.50*a*	20.00*a*	.057	.088	.06*h*	.095*h*	.....	.080	....
New York	.....	65.00	.....	17.40	24.20*p*	14.00	.....	.0725*h*	.1325*hp*	.....	.0725*p*	.214
Philadelphia	140.00	58.00	4.06	15.00*r*	.....	14.00 15.00	.....	.0625*h*	.....	.....	14.00*qr*	....
Pittsburgh	135.00	39.75	.....	18.00	23.00	.09	.16	20.00	36.00	.07	.06	.11
St. Louis	.....	39.00	.....	16.00	22.00	15.00*g*	21.00*g*	.0575*h*	.1212*h*	.648	.06	.11
San Francisco	.....	45.00	.....	10.90	21.15	10.90*g*	18.00*gr*	12.90	17.50*r*	9.50*gr*	.0525	.112
Seattle	.....	.....	.....	10.90*i*	23.40*i*	.....	20.40*gi*	11.40*i*	.....	.....	.0525*i*	.[illegible]

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3½x8½ in. *k* Tax included. *l* F.o.b. [illegible] *m* Per thousand. † Available on priority only and quoted specially. *p* No [illegible] drum shipments except to armed forces. *r* February 1943 prices, [illegible] available.

In war or peace
B.F.Goodrich
FIRST IN RUBBER

This tire leads a double life

A JOB our engineers did for the logging industry may save you money as soon as tires are more plentiful. Loggers had plenty of tire trouble. The tires that worked best on the cutted logging roads often failed when they hit smooth pavement and traveled at high speeds. The tires that worked on the pavement couldn't stand the gaff in the woods. Impact and bruise breaks were common.

B.F.Goodrich engineers tackled the problem. They designed and built a combination tire with more bruise-resistance and greater traction than a highway tire and one that is cooler running than an off-the-road tire. It's the "All-Purpose" Silvertown. They found it solved loggers' problems, and worked equally well in other operations where trucks worked on and off the pavement.

The "secret" of All-Purpose extra bruise-resistance is in the placing of *two extra breakers in the bottom of the carcass* in addition to two breakers *over* the plies. This gives *extra shock-resistance* in the critical area, *without* extra bulk to cause overheating.

On *off*-the-pavement work, the All-Purpose grips and is self-cleaning; its open design does not pick up stones. *On* hard surface pavements the broad, ample tread area gives full contact for smooth going *and* long wear . . . eliminates excessive pounding that causes localized hot spots and tread separation.

This new kind of tire is ideal for many types of *both* on-and-off-the-road trucking service. Supplies are limited, so place tentative orders early with the B. F. Goodrich dealer, or write us direct. *The B. F. Goodrich Co., Akron, Ohio.*

B.F. Goodrich
Truck & Bus Tires

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¾-in. billet *b*	RIVETS ½-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *c*	Tie Plates *c*	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.80	.....	$43.00	$43.00	$43.00*	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.80	$2.40	43.00	43.00	43.00*	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2.80	2.40	43.00	43.00	43.00*	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	....	....	2.15	....
Cleveland	2.10	2.15	3.75	2.80	.....	.....	.....	.....	....	....	....	....
Youngstown	....	2.15	.....	.....	.....	.....	.....	.....	....	3.00	....	....
Detroit	....	2.27‡	.....	.....	.....	.....	.....	.....	....	....	....	....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	....	....	....	....
Pacific ports	2.75*a*	2.80*a*	.....	3.30	2.95*a*	.....	.....	.....	....	....	2.30	....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates alone, Steelton, Pa., on * Per net ton

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LBS., BASE PRIC

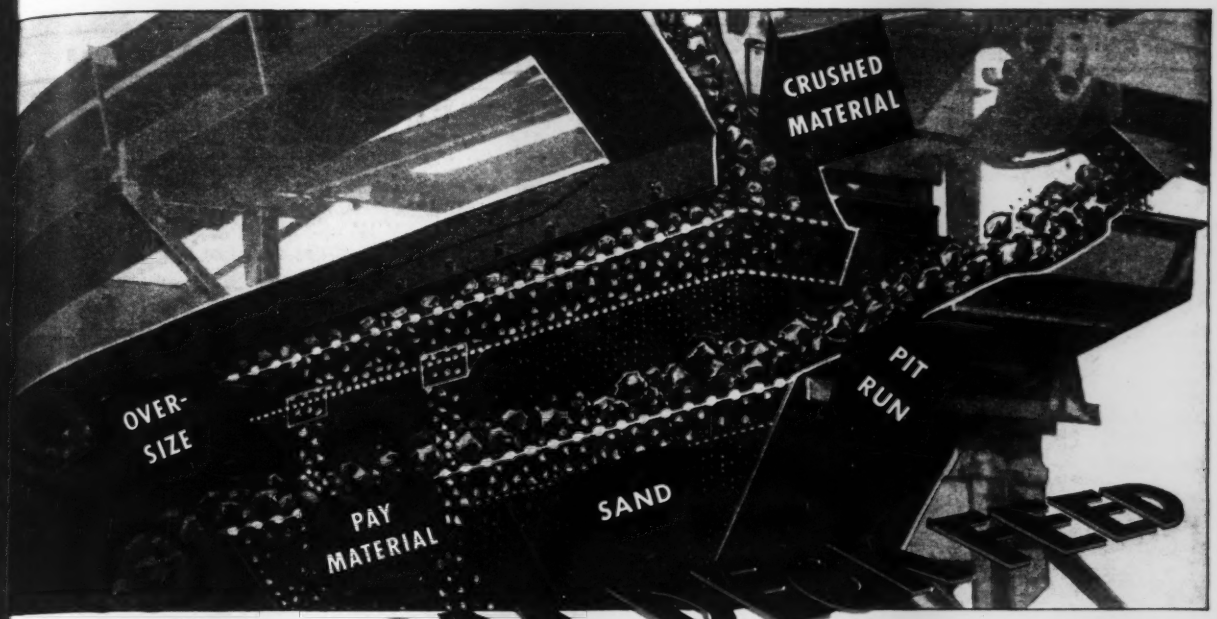
	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¾ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq. yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 sq. ft., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires *k* Per 100 s. f.	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.40	$2.40	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$1.91	$3.04
Baltimore	3.70	2.90	2.75	....	.10	22.50	24.50	1.70	1.27	1.79	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	1.89	....
Boston	3.912	3.994	....	$20 C.L.	.10	18.50	29.50	1.76	1.31	1.84	2.77
Chicago	2.10*a*	2.15*a*	2.15*a*	.03	.05	21.50	23.50	1.67	1.25	1.75	2.40
Cincinnati	3.68	2.53*ed*	2.53*ed*	....	.05	19.50	21.50	1.66	1.25	1.74	....
Cleveland	3.588*k*	3.10*k*	3.10*k*	.02½	.10	19.50	21.50	1.66	1.25	1.74	....
Dallas	4.25	3.17	3.17	....	....	25.50	27.50	1.93	1.42	2.03	....
Denver	4.57	3.33*k*	....	....	....	26.50	26.50	1.97	1.45	2.07	....
Detroit	3.661‡	2.50‡	2.50‡	....	.10	30.00	30.00	1.68	1.26	1.76	2.66
Kansas City	4.19	2.61*ed*	2.61*ed*	.0	.05	24.50	26.50	1.78	1.33	1.87	2.874
Los Angeles	3.65*f*	2.575	2.425	.02½	.05	23.00	27.50	1.93	1.42	2.03	3.65
Minneapolis	3.81‡	2.73	2.73	.0	.10	25.00	27.00	1.80	1.34	1.89	2.73*d*
Montreal	3.95*i*	2.90*i*	2.80*i*	....	....	31.00*hi*	46.00*hi*	2.76	3.44*i*	.282*im*	....
New Orleans	4.229‡*k*	2.52	2.52	.05	.10	19.00	21.00	1.82	1.35	1.91	2.875
New York	3.75	2.76*e*	2.76*e*	....	.15	17.50	19.50	1.76	1.32	1.81	2.74
Philadelphia	3.666	3.668	....	....	....	20.50	22.50	1.71	1.28	1.79	2.72
Pittsburgh	2.10*a*	2.15*a*	2.15*a*	.02½	.10	23.00	26.50	1.59	1.20	1.67	2.40
St. Louis	3.697	2.74	2.74	.0	.05	28.00	34.00	1.69	1.27	1.78	2.70
San Francisco	4.35	2.825	2.675	.02½	.10	21.00	24.50	1.93	1.42	2.03	3.70
Seattle	2.75*e*	2.80*e*	....	....	....	34.50	38.50	1.93	1.42	2.03	2.95*e*

‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus fr ight. *e* F.o. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between t billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *k* Quotation on changed basis; no actual price change. *m* Per sq. f

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	Delivered, std. 12 in., s.s	ASTM 24 in.	C13–35 36 in.	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM C 14–35 12 in.	24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Butt Weld 3½ to 6 in.; Lap Wel Black %	Galv. %	Black %	Galv. %
Atlanta	$50.66	$0.26*b*	$0.468*bc*	$1.8525*c*	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
Baltimore	54.00	.35	.60	2.70	7.25	160.00	200.00	.60	1.85	65.5	57.5	63.0	54.5
Birmingham	46.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
Boston	56.40	.371*r*	.7155*r*	2.79*r*	7.6875*r*	170.00‡*r*	265.00‡*r*	.60	1.95	....	....	....	....
Chicago	55.33	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	66.0	55.0	64.5	53.0
Cincinnati	54.27	.231	.4455	1.80	5.125	105.00‡*s*	170.00‡*s*	.75*t*	1.75*t*	57.1	43.4	54.0	39.6
Cleveland	55.75	.245*r*	.4725*r*	2.115*r*	5.535*r*	90.60	139.40	.36	1.38	68.5	57.5	66.0	54.5
Dallas	57.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	....	....	....	....
Denver	62.56	.29†	.52†	2.16†	3.00*n*	125.00	200.00	1.00	2.22	58.4	50.4	55.7	47.2
Detroit	55.75	.385	.7425	2.925	7.75	170.00‡*u*	260.00‡*u*	.36	1.75	57.6	44.0	54.5	40.2
Kansas City	56.73	.35	.59	2.20	6.20	140.00	260.00	.45	1.60	35.6	46.1	46.2	59.4
Los Angeles	69.40	.325†	.585†	2.70†	6.75†	130.50	217.50	1.00	2.00	61.1	50.1	58.6	47.1
Minneapolis	60.10	.305†	.549†	2.196†	6.25†	.....	.....	.90	2.10	64.2	53.2	60.7	49.2
Montreal	67.00	.85*o*	1.50*o*	5.25*p*	8.50*ep*	45.00*m*	64.00*m*	.48*m*†	1.92*m*†	....	....	....	....
New Orleans	52.78	.37*r*	.78	1.69	.....	150.00	220.00	.45	1.65	62.4	54.4	58.8	50.3
New York	53.40	.336	.648	2.835	6.97	.....	.....	.60	1.40	64.9	53.9	62.4	50.9
Philadelphia	52.00	.35	.675	2.75	7.50	165.00	225.00	.45	1.75	56.6	42.8	53.6	39.1
Pittsburgh	57.00	.266†	.513†	2.295†	5.945	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	54.5*i*
St. Louis	54.62	.32	.576	2.304	6.00	100.00	260.00	1.00*j*	2.15*k*	56.4	42.6	52.5	38.4
San Francisco	69.40	.3625*d*	.6525*d*	2.61	6.52	115.00	192.50	.58	2.34	45.0	31.0	41.0	26.0
Seattle	71.20	.40	.72	2.88	7.20	115.20	.....	.51*f*	1.44*f*	....	....	....	....

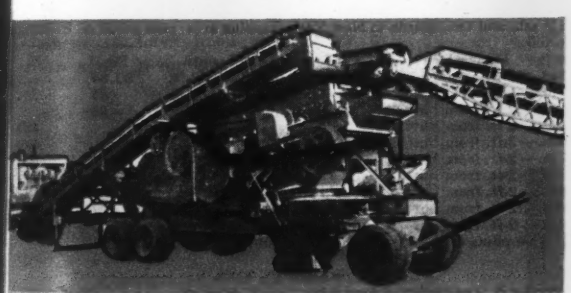
‡ Delivered. † F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N. J. (base) $50.00 Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional. 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.; ¼ in., 8½c.; ⅜ in., 11½c.; ½ in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92; 3 per cent tax on transportation costs not included. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, gal. 14½; 4 in. to 8 in. black, 32½ galv. 17. *r* Reinforced; spec. C 76–37. *k* Reinforced; spec. C 75–37. *l* Plus sales tax. *m* Tax included. *n* 27-in. pipe. *o* Less 50% *p* Less 53%. *r* Truck delivery. *s* Price quotations on delivered basis since May 1940; current f.o.b. price $84 for 6 in.; $130 for 8 in. *t* Reinforced pipe price since May, 1937; current plain pipe prices are: 12 in., 36c.; 24 in., $1.56 *u* Scarce: carload quantities not readily available.



BOTTOM DECK FEED

EXCLUSIVE PIONEER FEATURE

Doubles effective screen area—



YOU GET THESE ADVANTAGES:

1. **Balance the work of the two crushers without changing screens.**
2. **Produce "stone chips" in the main screen without extra screen equipment.**
3. **Control the gradation of the output to meet specifications.**
4. **Reject sand and control the percentage of sand rejected.**

Duplex screening is Pioneer's radical innovation to handle the extra gradation to be done where two crushers are used in a gravel or quarry plant.

Pioneer makes one vibrator screen do the work of two. Pit material is screened on the bottom deck and the crushed material on the top deck. Both decks produce specification or pay material and "chips" can be separated. The screen shown is a 4′ x 12′ unit whose two decks have a combined total working area of 96 sq. ft.

Only with this exclusive Pioneer bottom deck feed can you get all these advantages. Write or talk to Pioneer Plant users, or to Pioneer engineers and distributors for further information on how to handle large crushing capacity with a single screening unit.

Pioneer
ENGINEERING WORKS
Jaw Crushers · Roll Crushers · Screens · Conveyors · Feeders · Washers
ENGINEERS and MANUFACTURERS of QUARRY-GRAVEL and MINING MACHINERY
MINNEAPOLIS 13, MINN

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better end for No. 1 N. C. Box. (Prices in Bold Face)									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increments (See note for base price)	
	All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)												
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 R&H	6x12 R&H	12x12 R&H	2x12 R&H	12x12 R&H	⅝"	¾"
Atlanta	**$40.00**	**$40.00**	**$32.00**	**$35.00**	**$34.00**	**$37.00**	**$46.00**	.....	.....	**$57.00**	**$64.00**	**$17.90**	$21.85
Baltimore	**44.00**	**46.00**	**44.00**	**46.00**	**47.00**	**52.00**	**65.00**	.....	.....	**115.00**	**120.00**	**18.25**	22.25
	48.00	*49.00*	*55.00*	*55.00*	*55.00*	*67.50*	*68.00*	*$75.00*	*$75.00*	.....	.....	.....	.....
Birmingham	**45.00**	**45.00**	**44.50**	**43.50**	**44.50**	**47.50**	**68.00**	**55.00**	**56.00**	.....	.....	**17.35**	21.15
[1]	50.00	50.00	49.50	48.50	49.50	52.50	72.00	.....	.....	67.50	70.00	.....	.....
Boston	60.00[a]	60.00[a]	60.00[a]	60.00[a]	60.00[a]	62.00[a]	66.00[a]	.....	.....	58.00[a]	58.00	18.25	22.25
	55.00	*55.00*	*54.00*	*54.00*	*54.00*	*54.00*	*58.00*	*58.00*	*58.00*	.....	.....	.....	.....
Chicago	**54.00**	**54.00**	**54.00**	**54.00**	**54.00**	**60.00**	**68.00**	.....	.....	**80.00***l*	**95.00***l*	**14.60**	17.80
	55.00	*55.00*	*54.00*	*54.00*	*54.00*	*65.00*	*68.00*	*66.00*	*67.00*	.....	.....	.....	.....
Cincinnati	**47.50**	**49.00**	**42.50**	**42.50**	**42.50**	**44.50**	**67.00**	— — —	— — —	**65.00**	**65.00**	**17.35**	21.15
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cleveland	**42.50***k*	**42.50***k*	**52.50***k*	**51.00***k*	**65.00**	**65.00**	**83.00**	**83.00**	**83.00**	.....	.....	**17.75**	21.60
Dallas [e]	**45.25**	**45.25**	**44.50**	**43.00**	**43.00**	**47.25**	**60.75**	**58.75**	**58.75**	**88.75**	**85.00**	**14.60**	17.80
Denver [‡]	63.50[i]	62.00[i]	65.00[i]	65.00[i]	65.00[i]	66.00[i]	69.00[i]	*83.00*	*89.00*	.....	.....	10.45	12.70
Detroit	**61.00**	**61.00**	**57.75**	**57.75**	**57.75**	**63.75**	**71.00**	.....	**90.00**	**70.75**	**90.00**	**17.35**	21.15
	57.00	*57.00*	*57.00*	*57.00*	*62.75*	*72.75*	*75.00*	*75.00*	*90.00*	.....	.....	.....	.....
Kansas City [a]	**69.00**	**69.00**	**67.00**	**65.50**	**67.00**	**69.00**	**84.00**	.....	.....	**84.00**	**94.00**	**12.60**	15.40
	66.00	*66.00*	*59.50*	*59.50*	*59.50*	*59.50*	*75.00*	*80.00*	*80.00*	.....	.....	.....	.....
Los Angeles [a]	*60.00*	*60.00*	*60.50*	*60.75*	*59.25*	*59.25*	*72.75*	*72.00*	*72.00*	.....	.....	**9.90***ph*	12.05*ph*
Minneapolis [‡b]	59.00[g]	59.00[g]	.....	.....	.....	.....	.....	.....	.....	.....	.....	**12.60**	15.40
[‡]	*58.00*	*58.00*	*57.00*	*57.25*	*56.25*	*57.00*	*64.75*	*63.50*	*63.50*	.....	.....	.....	.....
Montreal [‡†]	*58.00*	*61.00*	*54.00*	*58.00*	*60.00*	*66.00*	.....	.....	.....	**200.00**	**200.00**	.....	.....
	54.00	*54.00*	*57.00*	*57.00*	*57.00*	*58.75*	*80.00*	*80.00*	*80.00*	.....	.....	.....	.....
New Orleans	**40.00**	**40.00**	**37.00**	**35.00**	**34.00**	**36.00**	**46.00**	.....	.....	**55.00**	**69.00**	**14.60**	17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	.....	.....	.....	.....	.....	.....
New York	**67.50**	**67.50**	**62.50**	**62.50**	**62.50**	**64.00**	**74.00**	.....	.....	120.00*f*	125.00*f*	**18.35**	22.25
[‡]	.....	.....	*65.00i*	*65.00i*	*65.00i*	*65.00i*	[Range from $75 to $95]			.....	.....	.....	.....
Philadelphia	**75.00**	**75.00**	**75.00**	**75.00**	**75.00**	**75.00**	**75.00**	.....	.....	**130.00**	**130.00**	**18.25**	22.25
	75.00	*75.00*	*75.00*	*75.00*	*75.00*	*75.00*	*85.00*	*90.00*	*90.00*	.....	.....	.....	.....
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	.....	.....	.....	.....	**18.10**	22.05
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*82.75*	*88.75*	*88.75*	.....	.....	.....	.....
St. Louis [‡c]	**61.00**	**61.00**	**57.00**	**56.00**	**57.00**	**59.00**	**71.00**	*75.00*	*75.00*	**87.00**	**87.00**	**14.60**	17.80
San Francisco [d]	*41.00*	*41.00*	*36.50*	*36.75*	*35.75*	*35.75*	*37.50*	*36.00*	*36.00*	.....	.....	**7.30***g*	8.90*g*
Seattle	*45.50*	*45.50*	*44.50*	*44.50*	*43.25*	*43.25*	*43.50*	*43.00*	*41.75*	.....	.....	**0.00**	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers N. C. Pine. [3] Spruce. [4] Native. [5] Western Pine, No. 3 Common. [6] Spruce. [7] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax.

Note: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface Seattle base price on ⅝", $95.15; on ¾", $104.85; price includes oiling and wax ing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment. *h* 50,000 lb. minimum. *i* Ranges from $65 to $75. *j* Average price *k* August 1943 price. *l* September price; none later available.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 — Single or Double Thickness		EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*	
	A quality	B quality		
Atlanta	75%	75%	$0.15	
Baltimore	78%	79%	.15	
Birmingham	76%	76%	.105	
Boston	77%	78%	.15	
Chicago	77%	77%	.15	
Cincinnati	77–10%	77–10%	.15	Price of 60% Ammonia Gelatin in $0.01 per lb. higher than 40%
Cleveland	77%	77%	.19	
Dallas	76%	76%	.1625	
Denver	76%	76%	.155*e*	
Detroit	77%	77%	.1575	
Kansas City	77–10%	77–10%	.155	
Los Angeles	86%*d*	88%*d*	.1575	
Minneapolis	77%	77%	.155	
Montreal	40–5%*ab*	47%*ac*	.1675†	
New Orleans	70%	75%	.16	
New York	81%	82%	.22*f*	
Philadelphia	78%	79%	.15	
Pittsburgh	79%	79%	.1225	
St. Louis	77–10%	77–10%	.155	
San Francisco	66%	73%	.155	
Seattle	75%	75%	.1575†	

a Discount from list Sept. 1939; sales tax included, but 6% tax exemption not allowed for. *b* Single thickness. *c* Double thickness. *d* Discount from jobbers' list Sept. 15, 1928.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal St. add delivery charge of $6.00 per trip. [1] F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine.	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 – .1525‡	.155 – .1725‡
Pacific N. W. States	.1075– .12	.1375–.15	.1575–.17
Pacific S. W. States	.1050– .1125	.1350–.1425	.155 –.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES TIES— F.O.B.

PILES

Prices per linear foot, fir and pine, bark on, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine based on freight from Norfolk.

Dimensions	Points	Length	By Rail — Pine*	Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.34	.....
12 in.— 2 ft. from butt	6-in.	50 to 59-ft.	.35	.....
12-in.— 2 ft. from butt	6-in.	60 to 69-ft.	.36	.....
12-in.— 2 ft. from butt	6-in.	90 to 100-ft.	....	.5575
13-in.— 3-ft. from butt	5-in.	91 to 100-ft.	....	.5608
14-in.— 2-ft. from butt	6-in.	50 to 69-ft.	.41	.6175
14-in.— 2-ft. from butt	6-in.	70 to 79-ft.	.43	.59
14-in.— 2-ft. from butt	5-in.	80 to 85-ft.	.54	.....
14-in.— 2-ft. from butt	5-in.	85 to 89-ft.	.57	.....
14-in.— 2-ft. from butt	5-in.	90 to 100-ft.	....	.60

* Pine piling over 80-ft. available only in limited quantities.

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8'6" Untr.	7"x9"x8'6" Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00*a*	2.50	$3.00*c*
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.86
	Mixed Oak	1.71	2.59	2.42	3.58
Birmingham	White Oak	1.00	1.60*a*	....	2.25*c*
Chicago	Red Oak	....	2.00/2.25*a*	....	2.87/3.00
Los Angeles	Douglas Fir	2.00	3.25*a*	2.90	4.70*c*
Philadelphia	Red Oak	....	2.10*ag*	....	3.25*cg*
St. Louis	White Oak	1.63	....	2.19	....
	Red Oak	1.63	2.20*a*	2.19	3.04*c*
	Sap Pine or Cypress	1.70	....	2.06	....
San Francisco	Douglas Fir	1.25*bcf*	....	....	3.00*cf*
Montreal	Birch or Maple	.85	.90	.....†	.....†

Tr.— Treated; Untr.— Untreated. *a* Creosoted. *b* 6"x8"x8'6". *c* Empty cell. *d* Zinc. *e* Green. *f* F.o.b. cars. † Out of market. *g* January 1943 price; none later available.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York	
Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.50– 3.10
Chlorine cylinders, liquid, per lb., delivered	.0825
Calcium chloride, 77–80%, flaked, 100-lb. paper bag, del'd, ton.	18.50–35.00
Silicate of soda, 52 deg. in drums, f.o.b. works, per 100 lb	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.15
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00–25.00
Sulphate of copper, in bbl., per 100-lb	5.00

(Continued from page 92)

Home building program continues to expand

Continued expansion of a home building program designed to relieve general congestion in war production centers is reported by Administrator John B. Blandford, Jr., of the National Housing Agency. Nearly 25,000 units have been authorized by NHA under this program, known as H-2 housing, in 111 communities where sufficient building labor was available for construction without interfering with direct war employment.

"Several additional quotas for important areas will be cleared in the next few days," Mr. Blandford declared. "I am hopeful that the H-2 program will prove a valuable bridge toward reconversion of the housing industry."

Within the limitations imposed by war conditions, the NHA is also doing all in its power to make possible for returning war veterans who are unable to find suitable accommodations for themselves and their families to build their own homes. Up to now more than 2,700 priorities for the construction of dwellings have been issued to former servicemen. In addition, more than 13,000 other priorities have been granted to relieve cases of individual hardship. However, supplying the necessary housing for migrating war workers remains the primary job of the NHA and the agency is moving promptly to meet new needs which have been created by a current spurt in some critical war activities.

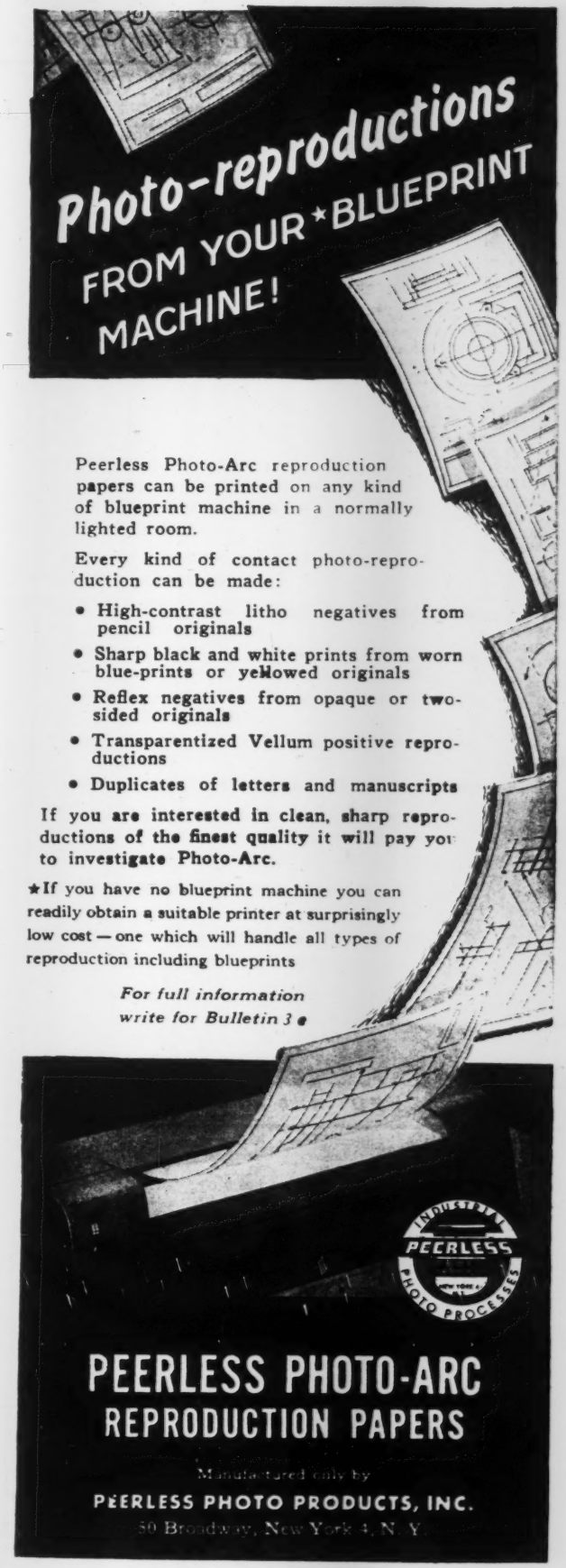
As of March 1, more than 53,000 units of war housing, both privately and publicly financed, were under construction. Of another 60,000 which were authorized and were ready to be placed under construction, 41,000 will be privately financed and 19,000 built with public funds. It is estimated that several thousand more temporary publicly financed units not yet authorized will be required.

At the end of February, a total of 1,791,822 war housing units or 94 percent of the assigned program had been completed.

• • •

A $5,000,000 airport for St. John, N. B.

An airport will be constructed nine miles east of St. John, N. B., by the Canadian government at a cost of approximately $5,000,000. Purchase of 2,000 acres of land is to be made by the county council of St. John, which will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STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE PARTITION — SCORED Per M lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M in quantity Common backing	Straight hard	LIME Per ton, Hydrated finishing	In paper, Common hydrated	Carload lots, Pulverized or lump
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$17.00	$20.04	$26.54	$15.04	$15.04
Baltimore	84.00	90.00	170.00	200.00	260.00	300.00	16.75*k*	20.75*k*	19.00	14.00	2.50
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.25
Boston	103.75*a*	110.65*a*	207.45*a*	248.90	.....	.....	20.00*i*	20.00*i*	21.00†	.....	16.00
Chicago	79.50	85.00	160.00	197.00	243.00	278.00	15.00	16.00	17.00	15.00	12.50
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	25.75	25.75	15.50	13.00	.....
Cleveland	82.50	97.35	182.50	.....	.....	.....	20.00	20.00	15.75*j*	13.25*j*	3.00
Dallas	71.40	76.70	145.30	183.50	238.00	294.50	15.25*i*	16.75*i*	19.00	15.00	15.00
Denver	84.80	95.40	153.70	178.20	212.00	227.90	14.50	18.00	25.00*j*	17.00*j*	20.00
Detroit	92.70	96.70	174.50	198.80	257.20	294.30	20.50	20.50	18.00	16.00	16.00
Kansas City	67.00	69.00	89.00*c*	128.00	163.00	189.00	17.50	18.50	19.32	13.00	10.92
Los Angeles	73.50†*r*	89.50†*r*	128.00*c*†*r*	210.00†*r*	368.00†*r*	460.00†*r*	13.50	15.00	16.50	17.50	17.50
Minneapolis	87.00*b*	92.80*b*	157.30*b*	.....	189.00*b*	262.00*b*	25.50	27.50*g*	21.00	16.00	19.00
Montreal	94.55*a*	100.45*a*	199.50*a*	160.45*a*	109.40*at*	137.40*av*	21.08†*u*	28.35†*u*	24.60*u*	18.00*u*	20.00*u*
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	90.80	96.80	133.10*c*	219.80*h*	269.80*h*	333.90*h*	17.50/18.50	.....	20.00	14.00	17.00
Philadelphia	104.20	111.20	208.40	250.10	305.10	377.70	18.75	21.75	19.00	16.00	15.00
Pittsburgh	74.20	79.15	148.40	163.75*x*	217.50*x*	231.00*x*	20.50	22.50	17.90	15.40	2.55*m*
St. Louis	67.00	72.00	130.00	190.00	244.00	290.00†	20.50	19.50	22.00	18.00	2.50*m*
San Francisco	96.00	108.00	144.00	108.00*t*	.....	.....	21.50	.....	24.00	23.00	2.50*m*
Seattle	115.00	125.00	230.00	.....	.....	.....	20.50*f*	24.00*f*	20.00*s*	20.00*s*	20.00*s*

† F.o.b. *a* Smooth. *b* Carload lots delivered to job. *c* 6x12x12 in., 3-cell. *d* Not load bearing. *e* 48 lb. tile. *j* Less $1.00, ½ cash 15 days, balance 30 days. *g* Selected common. *h* F.o.b. Perth Amboy, N. J. *i* F.o.b. Warehouse only. *f* LCL. *k* $1.00 discount if paid in 10 days. *l* Lump. *m* Per bbl., 180 lb. *o* Per bbl., 200 lb. *p* 280 lb. bag. *r* 5% discount 10 days. *s* 2% discount for cash. *t* 5½x8x12. *u* 8% sales tax included. *v* 6x12x12-in. *w* Per 200 lb. bag. *x* April prices, May quotation not available.

PAINT, ROOFING—F.O.B. CARLOAD LOTS

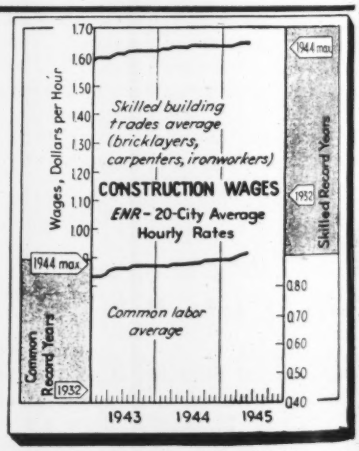
	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry *a*	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite *b*	Aluminum *b*	Ferric Oxide *d*	ROOFING SUPPLIES Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Carload lots f.o.b. factory Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.00
Birmingham	10.25	14.125	2.35	3.50*r*	1.98*r*	2.10	2.03	2.03	.32	28.35
Boston	10.00	13.75	1.75	2.50	2.31	2.00‡*h*	3.30‡*uv*	3.30‡*uv*	.25‡	21.00‡
Chicago	10.00	13.75	....	....	....	1.75*hf*	1.74*hf*	1.82*hf*	.33*f*	23.00*f*
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.20	2.10*h*	2.10*h*	.33	25.00
Cleveland	10.00	13.75	1.70	2.90	1.60	1.71	1.63*h*	1.63*h*	.237	25.00
Dallas	10.00	14.50	1.88	2.11*n*	.05*l*	1.75*h*	1.66*h*	1.66*h*	.35	39.00
Denver	10.50	14.25	....	....	.27*l*	2.45	2.95	2.95	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.25	2.25	2.25	.50	23.00
Kansas City	10.00	13.875	2.30*g*	2.55*gr*	2.16*g*	2.19	2.30	2.30	.28	2.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	10.00	13.875	....	....	....	1.8025*i*	1.7098*hi*	1.7098*hi*	.32	23.00
Montreal	.....	11.05	2.50*p*	4.90*p*	3.15*p*	4.02*t*	2.58*t*	3.01*t*	.89*t*	2.10*kt*
New York	10.00	13.75	2.03	....*r*	1.82	1.7098	1.6273*a*	1.6273*o*	.26	23.00
Philadelphia	10.00	13.75	1.60/1.80	2.20*r*	1.55	2.25	2.71	2.71	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.84*h*	1.84*h*	.34	26.00
St. Louis	10.00	13.75	2.28*s*	2.89*s*	1.96*s*	2.05	1.93	1.93	.34	24.00
San Francisco	10.25	14.00	1.80	2.75*n*	1.35	1.71	2.40	2.40	.33	20.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16*h*	....	.35	26.50

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. *a* Red lead prices change frequently due to pig lead price changes. *b* U. S. War Dept. Spec. 3–49A. *c* ASTM Spec. D266–31. *d* 80% minimum ferric oxide. *e* Subject to 25% discount. *f* Distributors' price to contractors. *g* 5 gal. can. *h* Per roll, 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per 100 lb. *l* Per lb. *m* Per bbl. *n* May, 1941 price. *o* 60-lb. roll. *p* Plus 8% sales tax. *r* Not available, except on priority rating; then quoted specially. *s* December, 1942 price. *t* Federal tax included. *u* 90-lb. roll. *v* Truck delivery.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Common Labor Heavy Const.
Atlanta	$1.50	$1.25	$1.50	$1.25	$1.50	$0.40	$0.50
Baltimore	1.75	1.4375	1.80	1.625/2.00	1.725	.80	.80
Birmingham	1.75	1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.675	1.50/1.875	1.667	1.00	1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.825	1.60	1.725	1.45/1.60	1.75	.90	.90
Cleveland	1.875*c*	1.575	1.875	1.875	1.875	1.085	1.125/1.155
Dallas	1.625	1.25	1.50	1.75	1.625	.60	.75/1.25
Denver	1.65*b*	1.50*b*	1.50*b*	1.50/1.625*b*	1.50/1.65	.80*b*	.80*b*
Detroit	1.725	1.50	1.825	1.675/1.825	1.725	1.00	1.00
Kansas City	1.75	1.50	1.625	1.675	1.70	.975	.90
Los Angeles	1.50	1.35	1.625	1.375	1.667	.875	.875
Minneapolis	1.625	1.44	1.625	1.50	1.625	.95	.95
New Orleans	1.625	1.375	1.625	1.55	1.50	.70	.80
New York	2.00*b*	1.85*b*	2.00	2.00*b*	2.00*b*	1.10*f*	1.00
Philadelphia	2.00	1.58	1.90/2.00	2.25	2.00	.90	.90
Pittsburgh	1.90	1.75	1.75	1.8125	1.875	1.00	.90
St. Louis	1.75	1.50	1.75	2.00	1.75	1.00	1.00
San Francisco	1.875	1.50	1.75	1.50/1.75	1.75	1.00	1.00
Seattle	1.845	1.545	1.745	2.00	1.845	1.145	1.145
Montreal*	1.05	.95	1.00	.90	1.00	.60	.65

b 7 hr. day. *c* Prevailing rate on government work.
* Cost of living bonus now including in basic wage.



ENR Skilled Average; (Bricklayers, Carpenters, Ironworkers) **$1.650.**
ENR Common Average; $0.909.

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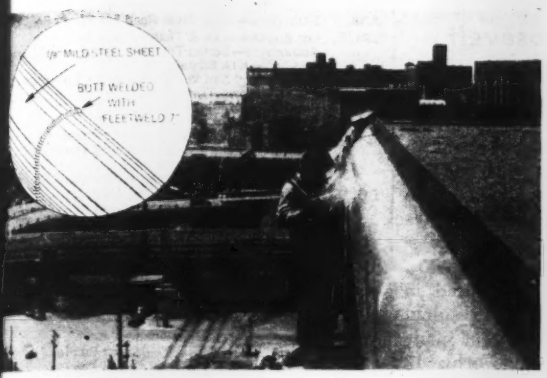

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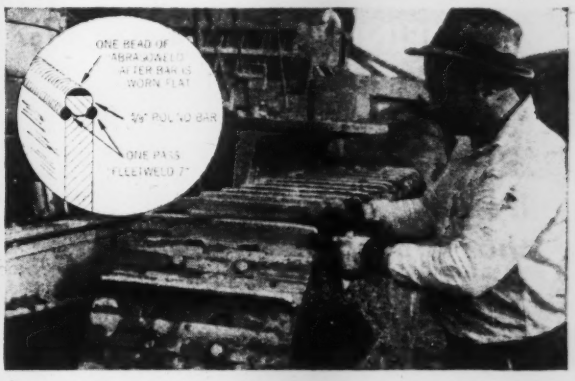

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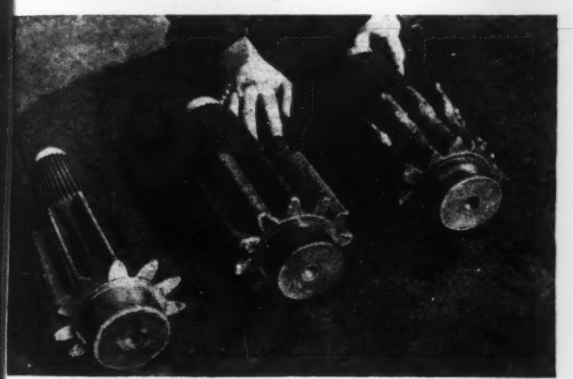

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operate the airport by arrangement with the dominion government. Most of the land is now timbered. The runways at the new Airport will be 5,000 to 7,000 ft. long and capable of accommodating the largest types of aircraft. Construction is scheduled to start soon after the end of hostilities in Europe.

• • •

Lake at Grand Coulee named after Roosevelt

The 151-mi. lake formed by the impounding of the Columbia River by Grand Coulee Dam in north central Washington has been named Franklin D. Roosevelt Lake in honor of the late President. This announcement was made by Secretary of Interior Harold L. Ickes on April 17.

Grand Coulee Dam was begun as a result of emergency funds allotted in 1933. Two years later, the President approved a change in plans that made the dam the greatest in the world. In August, 1937, Mr. Roosevelt visited the dam, spending a day inspecting closely the progress of the work and the plans for the development of the Columbia Basin project, of which the dam is the key structure.

"The development of the Columbia River Basin was near to the heart of Franklin D. Roosevelt," Secretary Ickes said. "He championed the dam, advocated the legislation that guaranteed the small, family farmer the opportunity to develop the sagebrush lands into secure irrigated farms. The tens of thousands of families who will make their homes on the irrigated land, the hundreds of thousands who use the power, and the millions who will enjoy the restful scenery of the lake, I am sure, will approve this token of honor to the late President."

• • •

Roosevelt memorial span proposed for Wilmington

A $25,000,000 bond issue for the construction of a bridge across the Delaware River near Wilmington, Del., has been voted unanimously by the State Legislature and signed by Governor Walter W. Bacon. The Delaware State Highway Department which will choose the exact site and supervise the construction in preparing to take soundings and draw plans for the bridge, which would have four traffic lanes.

It is proposed that the bridge be named the Franklin Delano Roosevelt Memorial Bridge, but State officials said that provision is made for the construction of a tunnel in the event federal approval of a bridge is withheld.

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MONT. Billings & Missoula—Industrial Equipment Co.
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Cambridge—Major Equipment Co.
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ORE.... Portland & Eugene—Howard-Cooper Corporation
PA..... Butler—National Equipment Co.
Pittsburgh—Atlas Equipment Corp.
Philadelphia—Service Supply Corp.
Harrisburg & Wilkes-Barre (Kingston)—
State Equipment Co.
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VA..... Richmond—Municipal Sales Company
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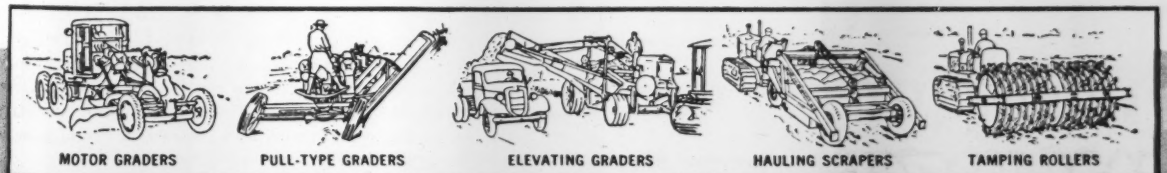

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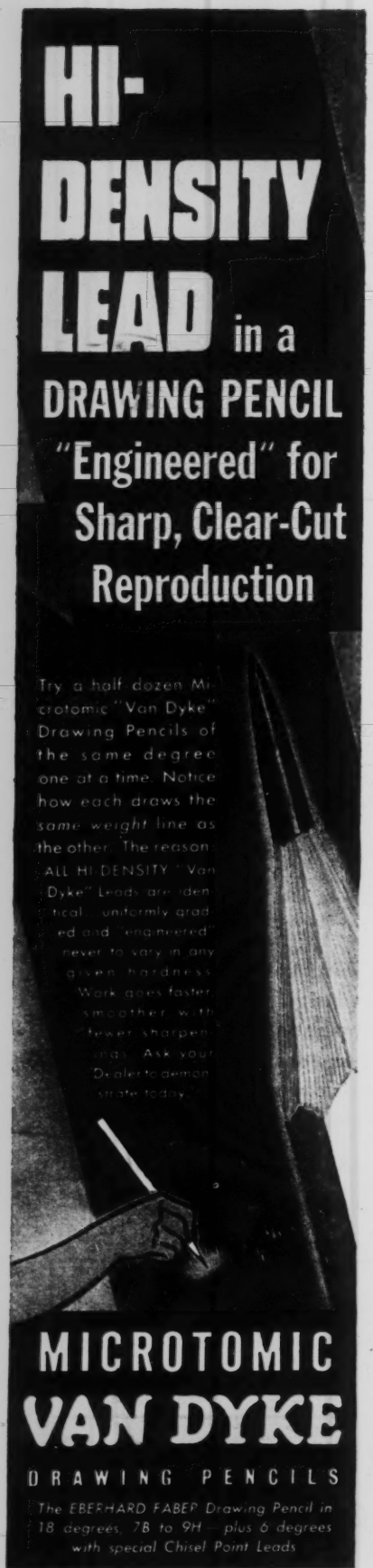
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Elections and Activities

The Building Officials Association of Milwaukee County, Wis., has been organized to prepare a uniform building code for Milwaukee County's eighteen municipalities. Officers are:—Chairman, W. Connell, Wauwatosa City; Vice-chairman, A. R. Lampe, Town of Lake; treasurer, J. Briske, Village of West Milwaukee; and Secretary, G. Grunwald, Milwaukee County.

Samuel Gould, Mahoning County engineer, has been elected president of the Northeastern Ohio County Engineers' Association. Don Patterson, Lorain County engineer, was elected vice-president, and Henry Waldeck, deputy engineer from Trumbull County, was chosen secretary.

Werner C. Knoop, consulting engineer, has been elected president of the Little Rock, Ark., Engineers' Club. Leonard A. Caldwell was elected vice-president; Ben W. Dees was renamed secretary-treasurer. The nominating committee was composed of E. F. Nelson, George D. Suter and Fred J. Herring.

The following officers have been selected by the Central California Chapter, Associated General Contractors of America: Carl Gellert, Standard Building Co., president; Robert McCarthy, vice-president; and Harry H. Hilp, Barrett & Hilp, treasurer.

Frank Capps was recently named president of the Engineering Professions Club of Jacksonville, Fla. Others elected were R. M. Garth, vice-president, W. J. Fowler, secretary, Richard W. Cloues, treasurer and H. H. Lauramore, program director.

John F. Hale, Dayton, Ohio, city engineer, has been elected president of the Ohio Society of Professional Engineers. Allison E. Neff, Shaker Heights, and C. E. Pettis, Toledo, were named vice-presidents, and D. W. Converse, Akron, was named secretary.

Newly elected officers of the Louisville Chapter, Associated General Contractors of America, are: Ali Bornstein, president, John L. Rommell, vice-president; Guy O. Hawks, treasurer, and D. R. Lyman, secretary.

The Association of Professional Engineers of Nova Scotia has elected J. R. Kaye, Halifax, president; J. L. Cavanagh, Malagash, vice-president; S. C. Mifflin, Sydney, J. L. Wickwire, Bridgewater, W. H. Chisholm and G. J. Currie, Halifax, members of the council. The retiring president was J. H. M. Jones, Liverpool.

The directors of the Milwaukee chapter of the Associated General Contractors of America have elected the following officers: President, Alfred F. Maier, Charles Maier & Son Co., Vice-president, T. L. Cottam, Hunzinger Construction Co., secretary-treasurer, Arthur C. Wolff, Arthur C. Wolff, Inc.

Del Fisher of Fisher Contracting Co., Phoenix, Ariz., has been elected president of the Arizona Chapter of the Associated General Contractors of America. Elected vice-president and treasurer for the current year was H. L. Royden of H. L. Royden Co., Phoenix, while Joseph P. Condrey was reappointed executive secretary. Directors, together with the president and vice-president, are: Bert M. Pringle, Phoenix; E. O. Earl, Phoenix and Tuscon, and I. G. Beall, Phoenix.

L. M. Keever has been elected president of the Raleigh, N. C., Engineers Club succeeding B. H. Davis. W. R. Doar was elected vice-president and R. C. Kirk was reelected secretary-treasurer.

The 51st annual meeting of the Ontario Good Roads Association was held in Toronto recently with an attendance of about 500. This association is made up of representatives of the various county units into which Ontario is divided for rural administration. The present status of highway work in Ontario was reviewed and officials of the Ontario Department of Highways, led by Minister G. H. Doucett, outlined postwar plans. William Keith, engineer of Wellington County, was elected president and W. S. McKay of Elgin County, first vice-president.

Walter L. Richardson of Seattle is the new president of the Washington State Society of Professional Engineers. Other officers are Joseph C. Mayer, vice-president; Merlin E. Custer, secretary-treasurer, and Conrad O. Mannes, assistant secretary-treasurer.

The Sam Houston Water Association of Houston, Tex., has installed the following officers: R. B. Allen, Houston city engineer, president; L. P. White, E. F. Lemel, Ernest Gallup, and P. L. Satterwhite, vice-presidents; Louis L.

New rope or old . . . you want

SAFER HANDLING

. . . Men and equipment need the increased protection of *PREFORMED* YELLOW STRAND

"Wire rope *safety?* Well," someone says, "we caution operators . . . keep equipment in repair . . . select rope of adequate strength and proper wire-and-strand construction. What's missing?" Just one thing: see that the rope is *Preformed* Yellow Strand.

Yes, this flexible, kink-resistant line that doesn't go out of control adds to safety. Its *manageability* comes from the factory *preforming* that dispels the inner tension of parts.

If you're cutting, splicing or reeving a rope, the same docility eliminates the necessity of serving the ends. Wires and strands that don't unravel are safer to handle.

And when long-lived *Preformed* Yellow Strand eventually nears retirement, still another safeguard appears. Surface wires that wear through are disposed to lie flat and remain harmless. They don't follow the unpreformed tendency to wicker out in jagged points, endangering workers' hands and adjacent wires, sheaves and drums. Men use *preformed* rope confidently, efficiently.

Specify *Preformed* Yellow Strand by name. Get all you should in wire rope performance and economy. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.

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Yellow Strand

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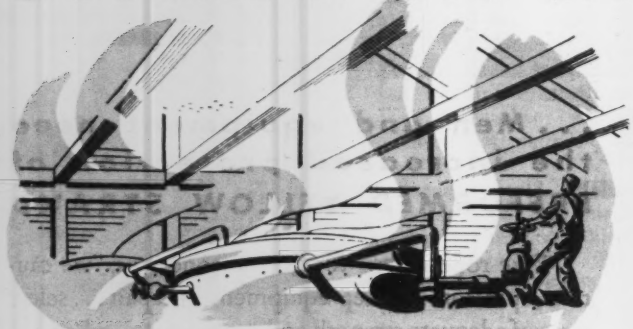
ALL STEAMED UP

But not Going to Go



Steam and chemical-laden vapors give ceiling and roof structures of wet process plants an awful beating. Ordinary lumber decays and other materials often go to pieces in a hurry. Wolmanized Lumber*, wood that's impregnated with Wolman Salts* preservative, is highly resistant to this attack. Its use adds years of service life here.

PRESSURE TREATMENT does the trick

Driving the preservative deep into the wood, under great pressure in steel retorts, is what does the trick. Protection is there for keeps. The excellent performance of hundreds of millions of feet of lumber so treated testifies to the worth of Wolmanized Lumber.

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James, secretary-treasurer; and Roger Moehlman, Lehde, W. L. Sanders, and H. V. Sheffield, directors.

The General Contractor Association of Milwaukee, Wis., elected the following directors at its recent annual meeting: S. M. Siesel, A. C. Wolff, L. P. Bauer, T. L. Cottam, and A. F. Maier.

Ralph E. Wendt of Jacksonville, Fla., is president of the Florida Engineering Society, succeeding J. H. Dowling of Tallahassee, chief engineer of the State Road Dept. of Florida. Other new officers are: M. B. Garris, Miami, first vice-president; Wylie Gillespie, Jacksonville, second vice-president; W. H. Beisler, Gainesville, secretary, and Raymond Chase, Jacksonville, treasurer.

Tom Priddy, of Van Wert, has been elected president of the Northwestern Ohio Drainage Association, representing 18 counties. Others elected were D. D. Gross, Walbridge, vice-president, and W. A. Hogle, Findlay, secretary-treasurer.

James C. Haddow has been elected president of the Edmonton, Alta., Builder's Exchange, succeeding F. W. Forster. Robert M. Dingwall was elected vice-president, and J. Lorne Mellish, secretary.

The Builders' Association of Kansas City, Mo., with more than 300 members in the designing, constructing and materials branches of the industry, recently held its 58th anniversary banquet.

R. A. Frigon has been elected chairman of the junior section, Montreal branch, Engineering Institute of Canada, succeeding J. D. Sylvester. Other officers elected were Vice Chairman, A. Gervais; secretary, T. S. McMillan, and councillors P. E. Salvas, J. M. Rousseau and J. E. Brett.

H. T. Patmore was elected president of the Building Contractors' Association at its recent organization meeting at New Westminster, B. C. H. J. Wood was named vice-president, while the executive committee will consist of: S. C. Carlson, H. Dyer, D. Lightbody, F. H. Shaw.

A provisional committee of organization of Quebec salaried professional engineers has been formed with these directors: M. Beaudoin, president; C. A. Mailhot, vice-president; L. M. Mantel, secretary; M. Lamoureax, treasurer; J. Connolly, director, and J. Delage, technical adviser. The group is being organized by salaried engineers of Montreal to improve conditions, especially as to remuneration.

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Get more WORTH from air with WORTHINGTON

Buy Blue Brutes

Worthington Pump and Machinery Corp.

New Aids to the Constructor

Blast Cap Improvements

Two new improvements have been added to all duPont's electric blasting caps—nylon-insulated wires and rubber plug closures. Both of these scarce materials are allocated to these caps by the War Production Board to speed the war effort.

The nylon wire covering, said to equal enamel insulation in preventing current leakage, is not affected by temperature changes. In brilliant colors, it minimizes mistakes in connection. The rubber plug closures, double crimped in the shells, are highly resistant to water penetration. *—E. I. duPont de Nemours & Co., Inc., Wilmington 98, Del.*

• • •

Vacuum Beam

A new development has been announced, in which atmospheric pressure is used for grabbing and bracing concrete products. In this process, one or more vacuum mats are used to grab the object; the mats have stiff backs which

make them act as beams, and they have rubber gaskets and valve inlets for vacuum hose attachment.

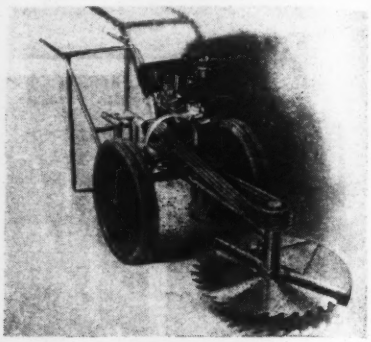
The mat is placed against the top or side of the object; by turning a valve instantaneous grabbing occurs. The "Vacuum Beam," which is attached to a hoist cable, acts as temporary reinforcement and increases the object's resistance to bending.—*Vacuum Concrete, Inc., 4210 Sansom St., Philadelphia 4, Pa.*

• • •

Fast Saw

Cutting through a 24-in. hardwood tree in less than 2 minutes and through 11 in. of spruce in 7 seconds, the new Lowther C-saw has a patented constant-centered drive that insures belt alignment. Said to operate smoothly at any angle on or off the ground, the saw has a 30-in. blade with extra large teeth and extra deep gullets; its speed is 1,150 rpm.

Four 112-in. V-belts connect two constant-centered drive pulleys. Wheels

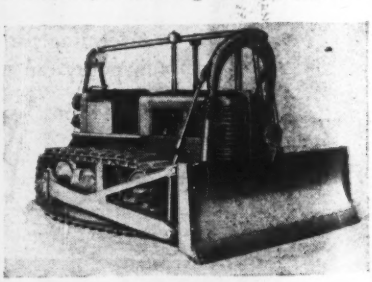


have needle bearing and have heavy-duty industrial type dual pneumatic tires as optional equipment for easy rolling over loose, sandy or soft ground. The 6 hp. air-cooled engine is said to be exceptionally economical of fuel.—*Harry A. Lowther Co., 141 West Jackson Blvd., Chicago 4, Ill.*

• • •

Cable-Controlled Bulldozer

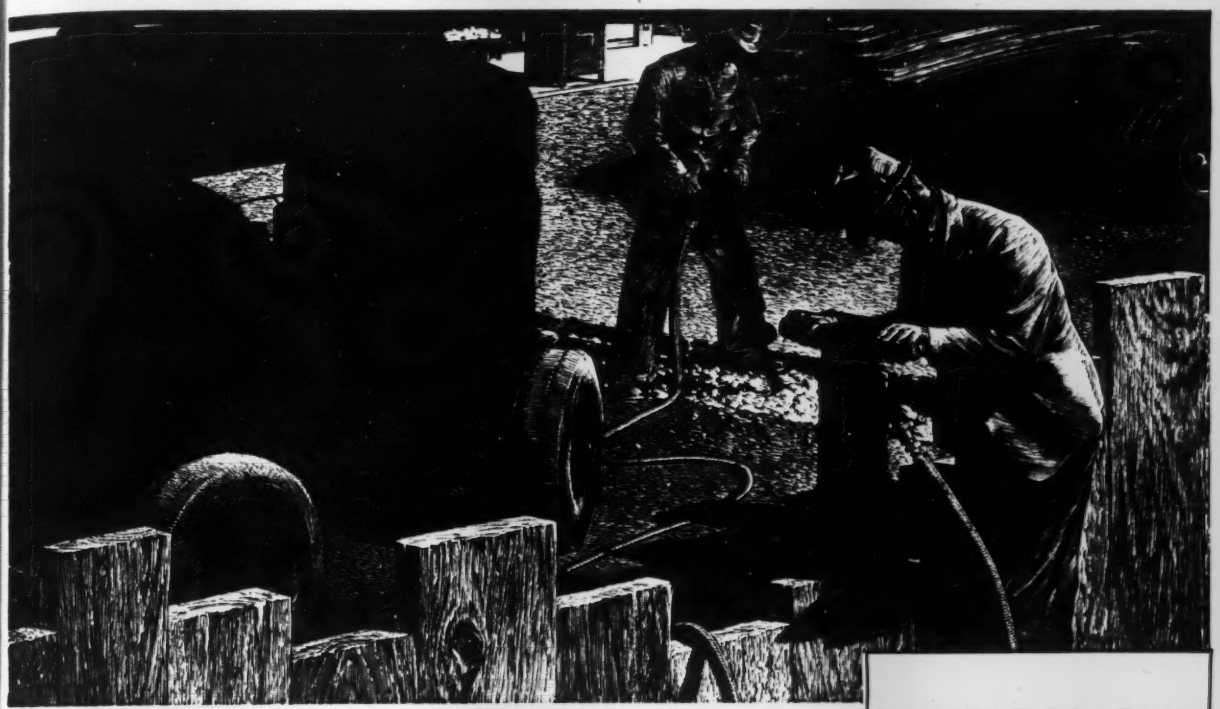
After considerable study and experiment, a new line of cable-controlled bulldozers, gradebuilders and power control units is available for use with Allis-Chalmers HD-14, HD-10 and HD-10W tractors. Features include: Sturdy, reinforced tubular arch; rugged box-welded moldboard; 5-position side arms which permit tilting of blade up to 10 in. on the bulldozer and 12 in. on the gradebuilder from a perpendicular position; 42-in. blade lift above ground on bulldozer, 50 in. on gradebuilder; blade



drop below ground level limited only by length of cable.

The power control units feature differential or self-energizing brakes whereby the dead end load assists the spring in setting the brake and is arranged so that the differential factor

DOLLARS DOWN TO EARTH



BUDGET-SAVERS—these Blue Brutes! When postwar construction plans come down to earth, they'll keep down costs on jobs like this:

Pittsburgh's $36,000,000 public works program including $4,719,550 for water mains, $9,142,500 for streets, $3,494,000 for sewers.

Other cities, too, have made substantial plans. Blue Brute air-power teams will back your effort then — and they'll help you, right now, on those jobs that call for sure power, free from time-wasting trouble.

Compressors, like the 210′ model shown above . . . Diesel, gasoline or electric driven . . . all have Feather* Valves — strongest, lightest, tightest, *proved* good for a lifetime — 3-point suspension of engine and compressor for rigid alignment — full force feed lubrication — and other trouble-savers.

Air tools — clay diggers, sheeting drivers, paving breakers — tools for *every* construction purpose — are better designed for sturdier, smoother action, easier handling!

Look 'em over now; plan now to get more worth from air with Worthington. Your nearest Blue Brute distributor is listed on page 164.

*Reg. U. S. Pat. Off.

HS-3

Behind the Fighting Fronts with

BLUE BRUTES

Essential LST's for amphibious war are speeded through production in a famous shipyard with the help of round-the-clock Blue Brute air-power. Also at work in hundreds of Army camps, Navy yards, air bases . . . here at home and on fighting fronts.

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Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

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We are in the market for a strong, tough, moisture-proof, all-weather paper which will materially reduce our job costs . . . a paper which has proved itself "tops" as a concrete curing and protective agent . . . one that eliminates all doubt as to the curing results. It must be a scuff-proof paper, capable of standing plenty of abuse and protect against drippings and debris. It must be time-tested and generally accepted by engineers and architects. Address your replies to "Wide Awake Contractors," Anywhere, U.S.A.

Here are a few of the Many Sisalkraft Uses

Cover and protect equipment against weather . . . cover stock piles . . . closing in . . . cover brick courses . . . lining construction shanties . . . cover sand cushion under terrazzo . . . over sub-fills . . . for all-around building protection.

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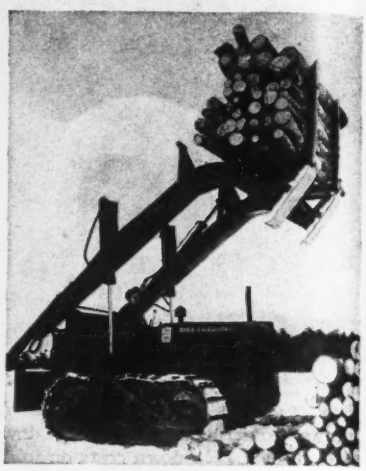
increases as band lining wears. "Air-conditioned" cone type clutches and band brakes are employed; all adjustments are made from rear. The drum barrel has curved contour at anchor end of drum which assists rope to wind closely at start of winding.—*Baker Mfg. Co., Springfield, Ill.*

• • •

Skid-Loader

Consisting of a steel frame with a rack attachment, the new hydraulically operated Drott skid-loader has a lifting capacity of 6,000 lb. and a loading height of 10 ft. The unit is said to op-



erate very quickly; it is mounted on a 60 hp. diesel tractor.

The rack is made up of two separate lower arms and two joined top arms. The lower arms are pushed into the material by the tractor's forward motion; the load is clamped tight by the top arms pressing down hydraulically, then lifted upward and tilted toward the unit. The skid-loader will transport, load and pile anything, from light shavings to rock, it is claimed, with proper type rack and bottom structures.—*Hi-Way Service Corp., 3841 West Wisconsin Ave., Milwaukee 8, Wis.*

• • •

Elevating Ladder Tower

Designed for elevation and extension by a single hand-operated winch, a new "Multi-Purpose" elevating ladder tower is self-locking at any extended height. It has a 360 deg. turning radius, for manual or automatic operation, and a variable inclination from 45 to 75 deg.

The elevating ladder is made in three strongly-trussed sections, locked in place by continuous steel guides. The standard tower opens to 35 ft. 2 in. maximum working height at a 75-deg. angle, with a minimum height of 22 ft. 8 in. at 45 deg. A folding 24x30-in. work platform has an adjustable tubular

10-point shatter-proof steel pipe

for post-war water lines

1. Offers greater all-round reliability—constant, dependable service.
2. Cuts installation, operating and maintenance costs.
3. Has low friction loss—greater carrying capacity.
4. Eliminates risk of sudden fractures—it's shatter-proof.
5. Withstands higher pressures.
6. Helps keep streets open for traffic.
7. Has greater resistance to earth movements.
8. Reduces water wastage because of fewer joints and leaks.
9. Has long life—many steel mains in service over 50 years.
10. Resists corrosion—In addition to A.W.W.A. coatings and linings, Duroline Pipe available for highly corrosive water.

In keeping with the times, city engineers are now planning to use modern steel pipe for post-war water lines.

Seamless Steel Pipe has proved beyond question that it has the strength and endurance for the hardest jobs in the country. It has been used during the war for every conceivable purpose where utmost reliability was required. It has demonstrated beyond all doubt its ability to stand up under intense shock, constant vibration, washouts, earth movements and high pressures.

The use of National Seamless results in low laying costs. It comes in long lengths, has fewer joints, requires less labor to install. The clean, smooth interior means less friction and full flow. The smooth exterior permits easy application of coatings for corrosive soils. Pipe linings and coatings furnished in accordance with A.W.W.A. specifications. The strength of steel, plus the merits of seamless, give *the ultimate in pipe for water lines.*

Write for Bulletin No. 21 on steel pipe for water mains.

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Straight line LEVERAGE..

See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear, in a straight line and with a square contact. The pawl is in *compression only*—no shear, no tension, no torsion. The shipper carries none of the load. This strong construction insures steady service.

LOWELL WRENCH CO., Worcester, Mass.

guard rail, with a trap door for easy access. —*Universal Fittings & Scaffolding Co., Zelienople (Pittsburg District), Pa.*

• • •

Airfield Mower

The "Grass Blitzer" is built in three, five, seven and nine-gang mowing units and can be hauled by tractor or truck

It is efficient at cutting at speeds up to 20 mph. The nine-gang mower, the one most frequently used for airport work, cuts a swath 21 ft. wide; thus about 370 acres might be mowed per 8-hour day. A transport trailer is available for carrying the mower units to other locations at high speed.—*Worthington Mower Co., Stroudsburg, Pa.*

• • •

Mississippi Wagon

Fitting into many types of hauling, three sizes of Mississippi wagon are now being produced—Model 75, 10.5 yd. heaped capacity with standard side

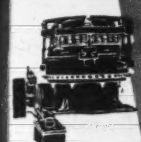
boards; Model 85, 10.5 yd. heaped capacity; and Model 120, 15 yd. heaped capacity.

Powered with a M-R-S special International Harvester diesel wheel tractor, this unit has a hydraulic transferring device between tractor and trailer. This is said to prevent hardship on the tractor during fast hauls and to provide

WILL YOUR PLANT BE *ready* to meet *after-the-war* COMPETITION?

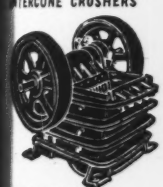
Complete modern Telsmith plant . . . producing both coarse and fine aggregates in several sizes.

MARY BREAKERS

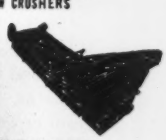


YRASPHERE CRUSHERS

NTERCONE CRUSHERS



W CRUSHERS



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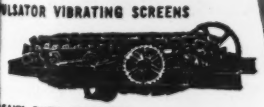

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● AFTER VICTORY your plant will face a changed market. Peacetime construction contracts and customers will be different. Competition will be keener. Such changes call for plant planning *now!* Rearrangements and additional equipment will be needed. For example, more re-crushing, screening, washing capacity . . . to produce the smaller sizes, in the quantities and quality your market demands. Modernize with Telsmith equipment. Give your plant this necessary product flexibility. Boost its output with Telsmith big capacity, free-from-grief, continuous, fast operation. Less power is required. Upkeep is lower. Telsmith equipment keeps your production costs down to a figure that insures you a good profit. Telsmith's 40 years of equipment-building complete-plant-engineering *know-how* is at your disposal. Write us in detail; or send for Bulletin E-2.

E-6

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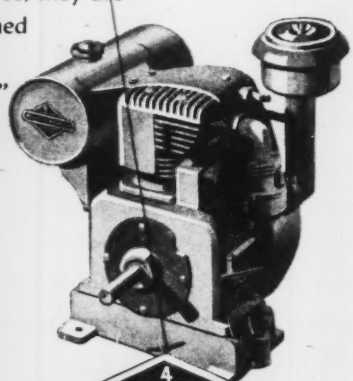

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extra weight for traction in rough going.—*M-R-S Manufacturing Co., Jackson, Miss.*

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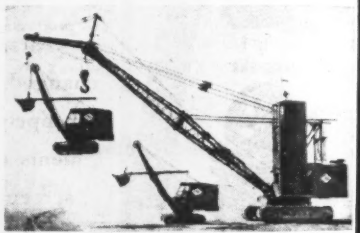
Crane-Shovel-Dragline

Three important functions are combined in a new addition to the Lima line. Known as Type 2000, this machine has



drums in tandem, and is equipped with air control.

As a crane, the unit has a lifting capacity of 100 tons; as a shovel or dragline it has a 5 cu. yd. capacity. It is powered with either a diesel or electric power unit, and can be converted in the field from one combination to another without major dismantling.—*Lima Locomotive Works, Inc., Shovel and Crane Division, Lima, Ohio.*

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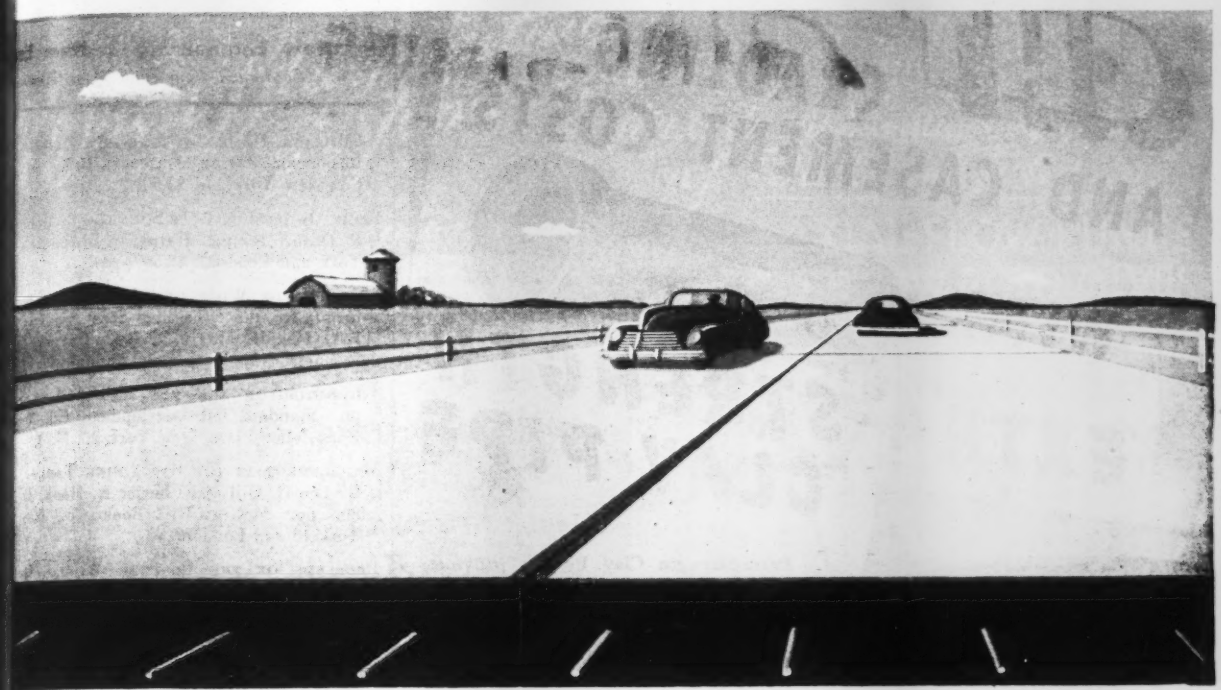
Stock-Handling Cart

To save steps and material handling in many departments, a new stock-handling cart, Model No. 2000-11, measures 30 x 16 in., and is 32 in. high. An extra center tray may be purchased, as well as a 16 x 14-in. desk accessory, which has a 5 deg. slope.

The cart is finished in Lyon green baked enamel, and is shipped set up.—*Lyon Metal Products, Inc., Aurora, Ill.*



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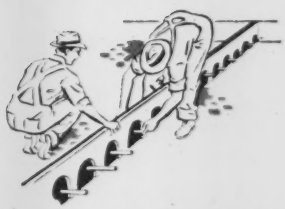

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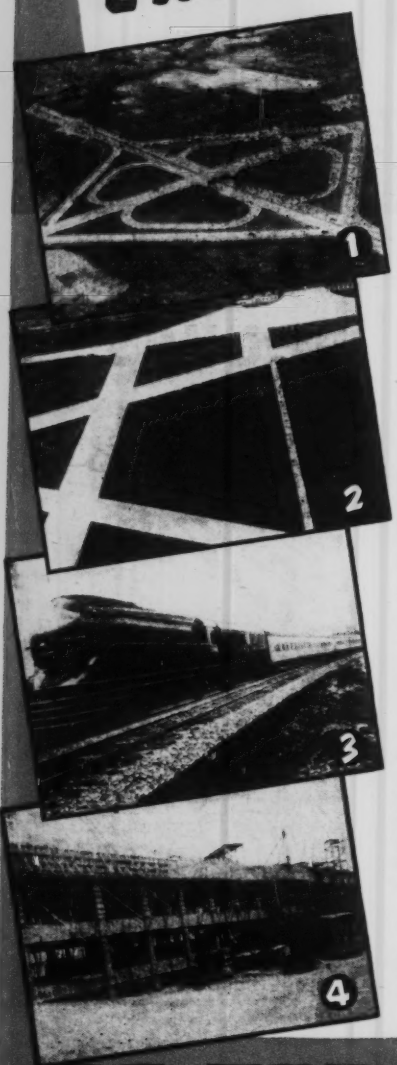

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(*Continued from page 144*)

A MILLION HOMES A YEAR—By Dorothy Rosenman. 333 pp. Harcourt, Brace and Co., New York 17. $3.50.

HOME OWNERSHIP, IS IT SOUND?—By John P. Dean. 215 pp. Harper & Bros., New York and London. $2.50.

PRINCIPIO TO WHEELING, 1715-1945—The history of the Wheeling Steel Co. By Earl Chapin May. 335 pp. Harper & Brothers, New York and London. $3.

THE FUTURE OF INDUSTRIAL RESEARCH—173 pp. Standard Oil Development Co., 30 Rockefeller Plaza, New York 20, N. Y.

MANAGEMENT AT THE BARGAINING TABLE—By Lee H. Hill and Charles R. Hook, Jr. 300 pp. McGraw-Hill Book Co., New York 18 and London. $3.

PROBLEMS OF THE POSTWAR WORLD—By Thomas C. T. McCormick. 526 pp. McGraw-Hill Book Co., New York 18 and London. $3.75.

BUILDING TODAY—By Martin S. Briggs. 112 pp. Oxford University Press, New York and London. $2. A survey of building trends in Great Britain.

AIR CONDITIONING ANALYSIS—By William Goodman. 455 pp. The Macmillan Co., New York. $6.

Reports and Pamphlets

75 YEARS OF ENGINEERING ACHIEVEMENTS IN THE MIDWEST—Anniversary Edition of the Journal of the Western Society of Engineers, Chicago 6, Ill.

A REPORT ON VERMONT HIGHWAYS—12th Biennial Report of the State Highway Board, Montpelier, Vt.

PUBLIC HOUSING IN NEWARK—Housing Authority of the City of Newark, Newark 4.

HOUSING LOOKS AHEAD—Annual Report of the Memphis Housing Authority, Memphis, Tenn.

REPORT OF OHIO WATER SUPPLY BOARD AND ADVISORY COMMITTEE TO THE GOVERNOR AND THE 96TH GENERAL ASSEMBLY, Dec. 20, 1944. Columbus Ohio.

HERCULES AND THE WAR—By Lowell Thomas. 38 pp. Hercules Motor Corp., Canton, Ohio.

TECHNICAL AND COMMERCIAL DEVELOPMENTS IN LIGHT GAGE STRUCTURAL STEEL—Address by Milton Male. American Institute of Steel Construction, New York 17, N. Y.

REPORT ON THE RECONNAISSANCE SEDIMENTATION SURVEY OF RADFORD RESERVOIR, RADFORD, VA.—By L. C. Gottschalk. Special Report No. 7, Sedimentation Section. U. S. Department of Agriculture, Washington 25, D. C.

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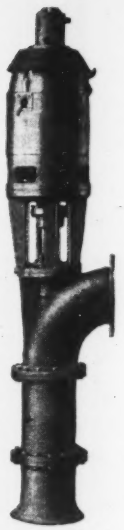

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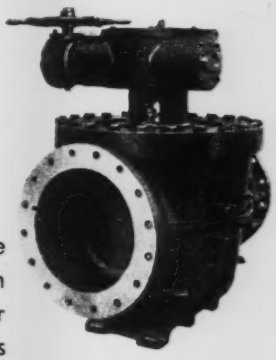

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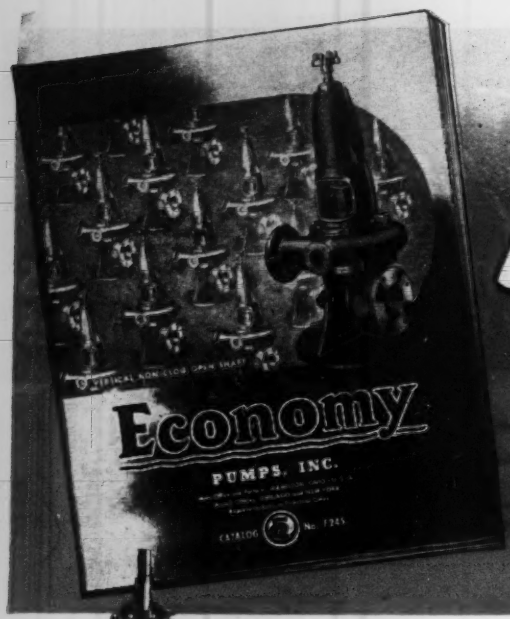

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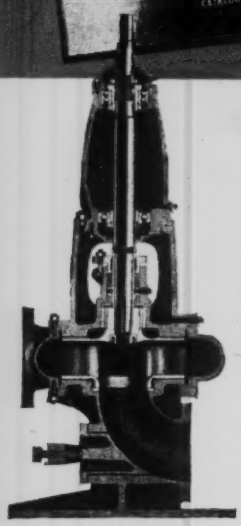

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GROUND WATER IN THE REPUBLICAN RIVER BASIN IN NEBRASKA, Part I, Nuckolls, Webster, Franklin and Harlan Counties—By H. A. Waite, E. D. Reed and D. S. Jones, Jr. The University of Nebraska, Conservation and Survey Division, Lincoln, Neb.

RESULTS OF PUMPING TEST OF MUNICIPAL WELLS AT TYLER, TEXAS—By W. L. Broadhurst. Prepared in cooperation between the Geological Survey, U. S. Department of the Interior, and the Texas State Board of Water Engineers, Austin, Texas.

ENGINEERS' COUNCIL FOR PROFESSIONAL DEVELOPMENT—12th Annual Report for year ending September 30, 1944. 33 West 39th St., New York, 18, N. Y.

SYRACUSE, N. Y.—Annual Report of the Department of Engineering, 1944.

SURFACE WATER SUPPLY OF NEW JERSEY—Stream Flow Record, Oct. 1, 1934 to Sept. 30, 1940 by O. W. Hartwell. State Water Policy Commission, Trenton, N. J.

ST. LOUIS, MO.—Annual Report of the Water Commissioner, Year ending April 10, 1944.

ESSEX, Mass.—Annual Report of the County Engineer, 1943.

FEDERAL WORKS AGENCY—Fifth Annual Report, 1944. Washington, D. C.

CONNECTICUT—Report of the Highway Advisory Commission, December 1944. Hartford, Conn.

MINNESOTA—Biennial Report of the Commissioner of highways from July 1, 1942 to June 30, 1944. St. Paul, Minn.

CONNECTICUT STATE WATER COMMISSION—Tenth Biennial Report, 1942-1944, including the reports of the State Board of Supervision of Dams and the State Flood Control and Water Policy Commission. Hartford, Conn.

PORTLAND, ORE.—Biennial Report of the Port of Portland Commission, 1943-1944.

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA—Sixth Annual Report, July 1, 1943 to June 30, 1944. Los Angeles, Calif.

ST. FRANCIS LEVEE DISTRICT OF ARKANSAS—Annual Report for year ending June 30, 1944.

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Men and Jobs

(*Continued from page* 91)

New division engineers named by Ohio Highway Director Perry T. Ford are: **Max Stringfellow,** Findlay, succeeding O. C. Kohli, in Division 1, with headquarters in Lima. He is a former Hancock County engineer and resident highway department engineer of that county.

Howard A. Keller, Bucyrus, to succeed acting engineer Robert C. Monnett, in Division 3, with headquarters in Ashland. He formerly was Crawford County engineer, assistant engineer of the highway department's bureau of construction and assistant division engineer of construction.

John M. Nee, Dover, to succeed E. R. McCullough, in Division 11, with headquarters in New Philadelphia. He is a former assistant engineer for the Pennsylvania Railroad and for several years was an engineer with the Ohio Department of Highways.

George W. Kerr, Newark, to succeed H. P. Christy, in Division 5, with headquarters in Newark. He has been with the division several years and also has served as materials engineer for the department.

In addition, **Eugene Davis,** Columbus, assistant Division 6 engineer in charge of construction, has been named acting division engineer.

Lt. (jg) Emil C. Shearon of Raleigh, N. C., graduate of the N. C. State College, School of Engineering, has been assignd as assistant to the supervisor of shipbuilding at Orange. Tex.

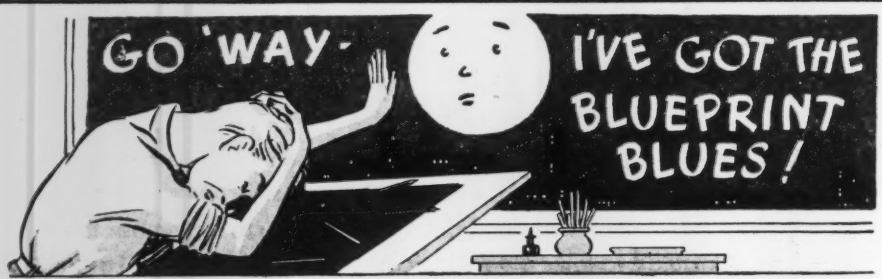
R. V. Rivenbark, of Goldsboro, N. C., who prior to entering the Army was connected with the engineering department of the North Carolina Highways and Public Works Commission, recently was promoted to the rank of captain at McCloskey General Hospital, Waco Annex, Waco, Tex., where he is in charge of the administrative works.

Arnold V. Finch, deputy Lucas County, Ohio, engineer, has been named division engineer for the Ohio State Department of Highways in the Toledo area, succeeding E. B. Baur, acting division engineer. Mr. Finch has been engaged in postwar planning work in the Lucas County engineer's office. He was chief engineer on construction of the Rossford Ordnance Depot.

James C. Collins, of Americus, has been made assistant division engineer of the Macon division, Georgia State Highway Department. Mr. Collins has been resident state highway engineer of the Americus district for 15 years. He will be succeeded by **Ray B. Ansley,** who has been assistant to Mr. Collins for several months.

Lieut. Col. Cleveland B. Coe, Corps of Engineers, executive officer of the Army Ground and Service Forces Redistribution Station, at Camp Butner, N. C., for the past six months, has been named commanding officer. A civil engineer with the Tennessee Valley Authority, Knoxville, Tenn., before being called to active duty with the Army in 1940, he served as adjutant and executive officer at the First Military Area Headquarters, Camp Forrest, Tenn., and Camp McCain, Miss., prior to going to Camp Butner. He served with the 32nd Division in the first World War, saw action in the Meuse-Argonne campaign, and later served with the Army of Occupation.

Lieut. Col. W. E. Phillips, a graduate in engineering of the University of Toronto, has been appointed chairman of the board of governors of the university, succeeding D. Bruce Macdonald. **Orville D. Vaughan,** another graduate engineer, has been appointed a governor of the university.



Well, Bill, so long as you use drawing pencils with soft, crumbling leads, you'll get smudged drawings and bad blueprints. Treat yourself to the pencils that never crumble, that produce clean, dense, opaque lines every time. Get Typhonite Eldorado!

These great pencils are unerringly uniform in every degree. Drawings made with Eldorados result in blueprints as clear as a bell and a pleasure to read. We'll send you a free Comparison Sample, Bill. Request it on your business or professional stationery, specifying degree.

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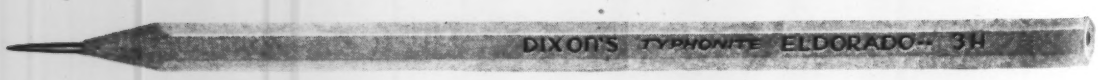

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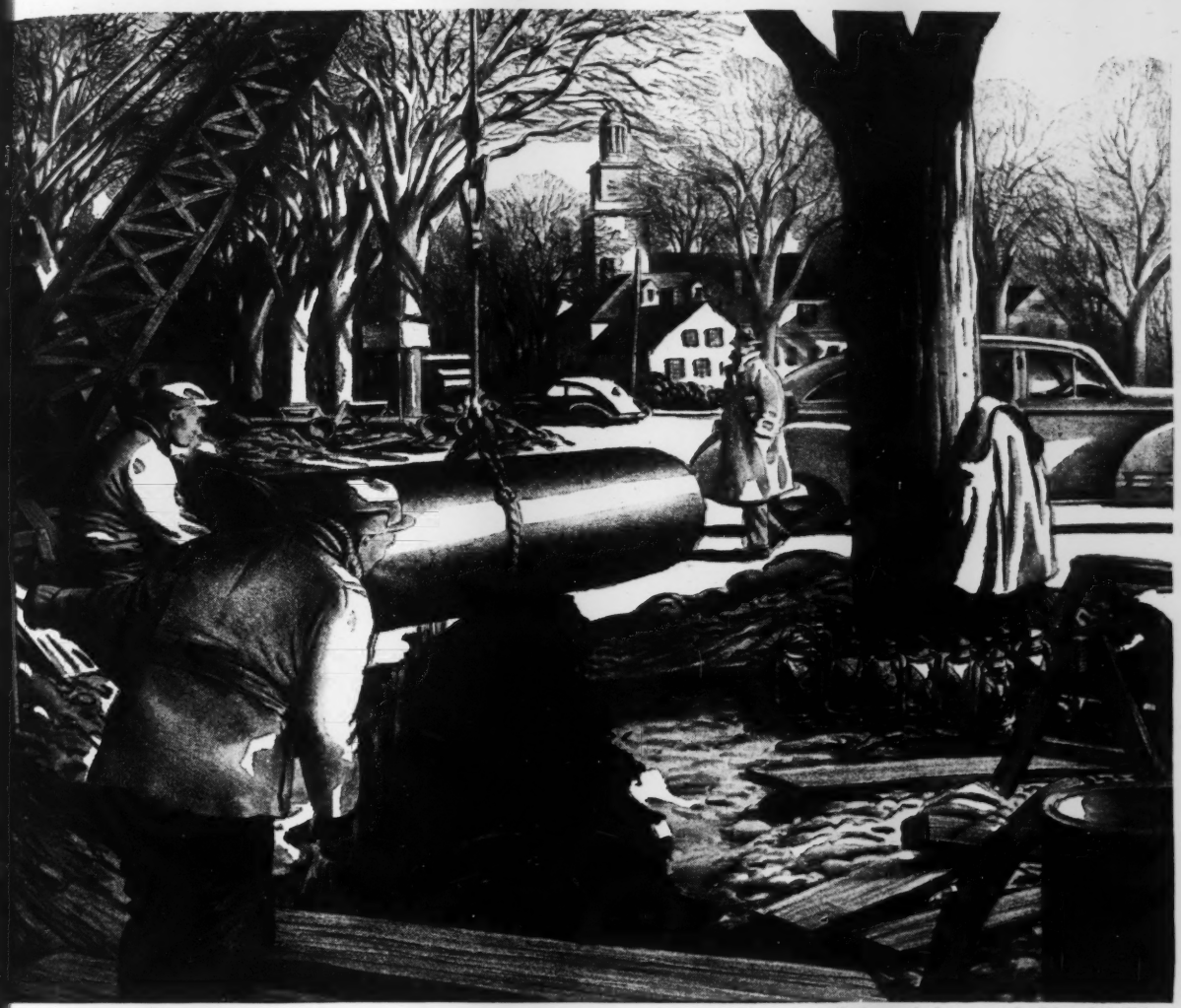

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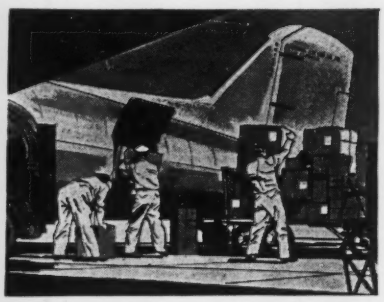

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Raymond F. Leonard has been named chief of the division of land planning for the Philadelphia, Pa., City Planning Commission, and **Hans Blumenfeld** has been appointed senior land planner. Mr. Leonard has been field secretary for Massachusetts planning boards. He also has held a staff position with the Tennessee Valley Authority and has been associated with the National Resources Planning Board as senior technician. Mr. Blumenfeld was educated at polytechnic institutes in Germany and has had wide experience in city planning and housing development here and abroad.

Lieut. Col. Henry S. Brooks of Oxford, N. C., has been promoted to his present rank from major in Burma where he is executive to an Air Force headquarters engineer. A construction specialist before entering the service four years ago, Colonel Brooks is a graduate of the North Carolina State College Engineering School, and was in charge of building military installations in southeastern United States.

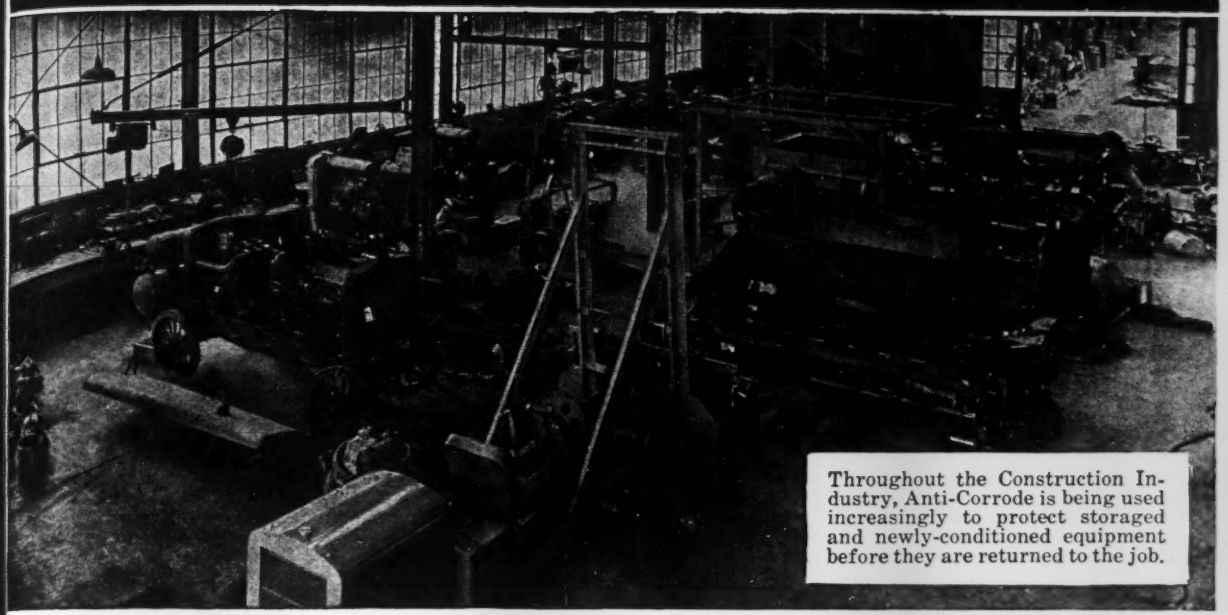
Harold M. Mayer has been appointed head of the division of planning analysis of the Philadelphia Planning Commission. For the last five years he has been research planner for the Chicago Planning Commission.

2d Lieut. John M. Samonds, Jr., of Charlotte, N. C., an engineer in civilian life, who had been reported missing in action in Germany with Combat Engineers of the Seventh Army since Dec. 14, was liberated from a German prison camp by the Russian army during its advance through Poland.

E. K. Burton, formerly engineer for the Oregon State Highway Commission at John Day, Ore., has been appointed city manager for Nyssa, Ore. He previously had served ten years as city manager of Silverton, Ore., and fifteen years as city engineer of Marshfield, Ore.

Graham Steel, civil engineer, recently assumed direction of postwar planning for the Seattle, Wash., Chamber of Commerce. Previous to his recent association with the Aluminum Division, Olin Corp., in Tacoma, Wash., where he directed construction of a $6,000,000 aluminum reduction plant, Mr. Steele served with the Bethlehem Steel Export Corp., managing sales to Scandinavia, Eastern Mediterranean and Southwest Pacific countries in 1940-41. Spending 15 years in South America as treasurer and later as vice president of Warren Brothers Co. of Argentina, he directed construction and development projects costing $17,000,000.

STOP RUST this New, Efficient Way—



Throughout the Construction Industry, Anti-Corrode is being used increasingly to protect storaged and newly-conditioned equipment before they are returned to the job.

Anti-Corrode film protects your metal parts and equipment ... prevents corrosion and rust formations

Anti-Corrode #100 is one of several new types of Cities Service protective coatings for metals. Designed to prevent corrosion of raw stocks, finished parts and completed machines—either in storage or in active service—Anti-Corrode adheres firmly to metal surfaces, displaces moisture and protects longer than similar materials now on the market.

Cities Service Anti-Corrode #100 may be applied by ordinary work-shop methods—spraying, dipping, brushing or rolling. Independent of metal quality, finish and irregularity of surface, the protective film is continuous and non-porous—does not break at sharp edges or rupture on flat surfaces.

Cities Service Anti-Corrode #100 serves as a lubricant as well as a rust preventive and need not be removed from metal to be stamped, drawn, or otherwise formed. It can be removed simply with kerosene or any petroleum solvent.

ANTI-CORRODE Gives You 10 BIG ADVANTAGES

1. Adheres to all metal surfaces.
2. Impervious to humid atmospheres.
3. Water-repellent.
4. Resistant to sun rays.
5. Chemically inert to ferrous and non-ferrous metals.
6. Inhibits *"under"* rusting.
7. Easy to apply—easy to remove.
8. Lubricates as it conserves.
9. Will not become brittle.
10. Protects metals in service or storage.

Whether your problem is to protect a single valuable tool or a million dollars worth of metal or equipment, write now for a free demonstration of Anti-Corrode. Mail the coupon today.

CITIES SERVICE OILS — ONCE-ALWAYS

CITIES SERVICE OIL COMPANY

ARKANSAS FUEL OIL COMPANY

ANTI-CORRODE

SAFEGUARD FOR THE CONSTRUCTION INDUSTRY

Cities Service Oil Company
Room 399
60 Wall Tower, New York 5, N. Y.

Gentlemen: Please contact me for a FREE demonstration of Anti-Corrode in our plant. (This offer limited to industrial users in Cities Service marketing areas East of the Rockies.)

Name .....

Position .....

Company .....

Address .....

City ..... State .....

Series 1200 Steel Air Hose Nipples

Series 100 Universal Type Hose Coupling

A DIVERSIFIED LINE FOR INDUSTRIAL AND CONSTRUCTION USE

LE-HI HOSE COUPLINGS AND FITTINGS

Series 400 High Pressure Hose Coupling

Series 800 Malleable Iron Suction or Water Hose Coupling

Series 650 Combination Male Hose Nipples

Series 700 Single Bolt Malleable Iron Hose Clamp

Series 900 Brass Long Shank Hose Coupling

LE-HI offers a complete line of Hose Couplings and Hose Fittings . . . for air, steam, oxygen, water etc., for a wide variety of low and high pressure applications.

Check these LE-HI features:

★ Interchangeable
★ Leakproof
★ Watertight
★ Priced Right
★ Easily Coupled and Uncoupled
★ Positive Locking
★ Rust Resistant

Send today for your copy of LE-HI Catalog No. 644, the complete story of a complete Hose Coupling Line.

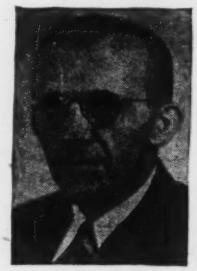
SOLD ONLY THROUGH DISTRIBUTORS AND RUBBER MANUFACTORERS

LE-HI HIGH and LOW PRESSURE HOSE COUPLINGS

HOSE ACCESSORIES COMPANY

Manufacturers' Activities

R. P. TYLER has been appointed general sales manager for Macwhyte Co., wire rope manufacturers, Kenosha, Wis. He is widely known throughout the industry, having been sales manager for A. Leschen & Sons Rope Co., of St. Louis, Mo., and prior to 1940 in sales and engineering capacities with John A. Roebling's Sons Co., Trenton, N. J.



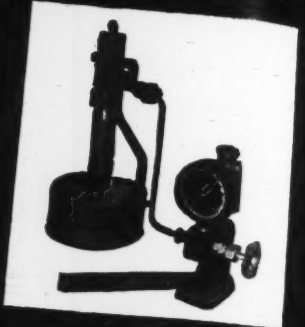
H. E. Sawyer, formerly general sales manager as well as vice-president and treasurer of Macwhyte Co., will continue as vice-president and comptroller.

M. F. HOLAHAN, after 50 years with International Harvester Co. and one of its predecessor companies, has ended his services as first vice-president. He will remain a member of the board of directors and in a consulting capacity. J. L. McCaffrey, former second vice-president, will succeed Mr. Holahan as first vice-president. Mr. McCaffrey, also a member of the board of directors, is a former vice-president in charge of sales. W. E. Worth, former vice-president in charge of supply and inventory, has been elected second vice-president to succeed Mr. McCaffrey. Mercer Lee, former assistant to the vice-president, has been elected vice-president, and will be in charge of supply and inventory. Peter V. Moulder, general manager of the Motor Truck division, R. P. Messenger, general manager of the farm implement division, and Ralph C. Archer, general manager of the farm tractor division, have been elected vice-presidents. They will continue as executive heads of their respective divisions.

R. C. BENNER, Director of Research for the Carborundum Co. for the last 18 years, has announced his retirement. He was graduated from the University of Minnesota in engineering in 1902, later taking his Ph.D. at the University of Wisconsin. During his experience of 40 years, he has been a registered engineer as well as a professional inventor, holding more than 250 patents, covering not only the fields of abrasives, refractories and electric furnaces, but

ADECO NOZZLE TESTER

Keeps Diesel Engines Running Efficiently



TESTS FUEL INJECTORS AND HYDRAULIC DEVICES At Pressures Up To 10,000 p.s.i.

To keep diesel engines operating at peak efficiency, this portable, precision-built Adeco Nozzle Tester is indispensable.

Light in weight yet built for heavy-duty service, it enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p.s.i. Prevents costly delays and possible damage to engine.

Ideal for testing hydraulic devices.

Write for bulletin on this practical, low-cost unit.

ADECO

AIRCRAFT & DIESEL EQUIPMENT CORP.
4411 NO. RAVENSWOOD AVE.
CHICAGO 40, ILLINOIS

Illustrated above — Curvex† Sentry, 17-jewel Precision movement, pink or yellow gold-filled case, $55.00 (Federal Tax included).

He missed his train by 1/10,000 of an inch

A tiny part of his watch movement was 1/10,000 of an inch off... result: his watch lost a fraction of a second. But what's a fraction of a second? Listen... It's a lost train... a lost contract... a lost appointment! Yes! 1/10,000 of an inch can be mighty important in a watch . . . That's why we at Gruen have never been satisfied with anything less than precision accuracy since 1874 . . . Remember, Gruen is the only watch in the world permitted to carry the trademark, "Precision"!

Gruen Watches from $29.75 to $250; with precious stones to $4,000. The Gruen Watch Company, Time Hill, Cincinnati, Ohio, U.S.A. In Canada: Toronto, Ont.

While we have been manufacturing large quantities of vital precision instruments for war, we also continue to produce fine Gruen Watches for civilian use . . . but of course the demand for these watches far exceeds production possibilities today.

ARMY E NAVY

AWARDED TO WAR INSTRUMENT DIVISION

BUY A GRUEN WATCH . . BUT BUY A WAR BOND FIRST

GRUEN
THE PRECISION WATCH

"Precision," "The Precision Watch" and "Curvex" are the registered trade marks of The Gruen Watch Company.

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GRUEN . . . THE PRECISION WATCH . . . AMERICA'S CHOICE FOR OVER 70 YEARS

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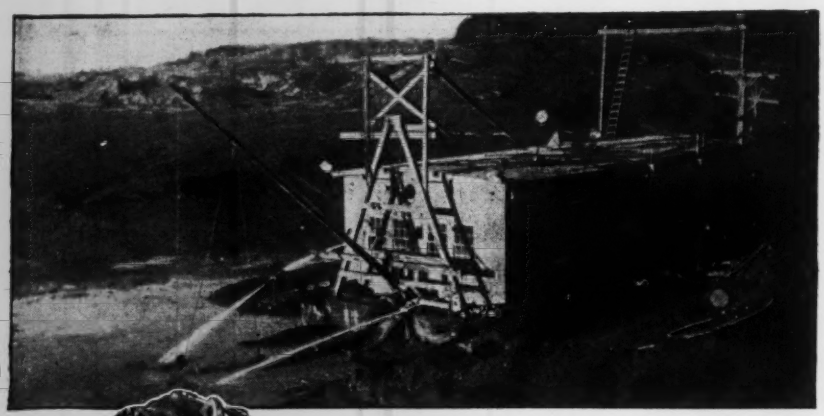
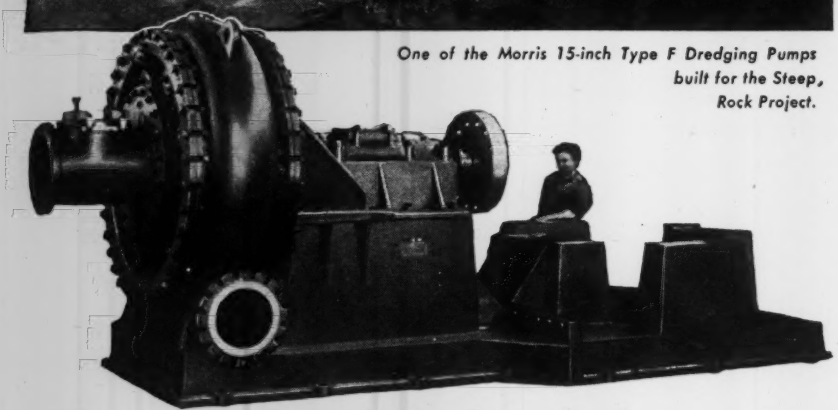


One of the Morris 15-inch Type F Dredging Pumps built for the Steep, Rock Project.



Over 1,000,000 cu. yds. of Overburden pumped from Lake Bed in 5 months with

MORRIS TYPE F HEAVY DUTY 15 INCH DREDGING PUMP

Steep Rock Iron Mines, Ltd., has taken initial steps to permit open-pit recovery of iron ore from beneath a wilderness lake by changing the course of a river and draining the lake. Up to 120 feet of overburden is being successfully removed from the ore beds by a 15-inch Morris Dredging Pump, directly driven by a 750 hp. variable speed motor. This pump, installed in a Morris-designed dredge, is provided with 18-inch suction piping and 16-inch discharge piping.

As overburden is removed, and the dredge reaches levels approaching the ore body, a duplicate 15-inch Morris Dredging Pump will be installed in the pipe line as a booster unit. In the meantime this second Morris Pump will be utilized on another dredge.

The Morris Type F Heavy-Duty Dredging Pump is expressly designed for deep dredging, efficiently handling a high percentage of solids against high heads and through long pipe lines. It withstands abrasion through prolonged and severe service.

Write for Bulletin No. 158, containing complete specifications. Morris engineers, experts on dredging problems, and backed by eighty-one years reputation, will make recommendations on any dredging projects presented.

MORRIS MACHINE WORKS Baldwinsville, N. Y.

Branch Offices in Principal Cities

MORRIS CENTRIFUGAL PUMPS

also dry cells, smoke screens and sulphur recovery.

C. KIER DAVIS, president of Athey Truss Wheel Co., Chicago, Ill., died as a result of an automobile accident which occurred in Chicago on March 7. He became associated with Athey in 1936 as secretary and treasurer. In 1937 he was made a director and since October, 1940, served as president.

Under his leadership the company enjoyed a period of growth and expansion. He is survived by a son, Col. Leonard K. Davis, serving with the U. S. Marine Corps.

FORT WAYNE ENGINEERING & MANUFACTURING CO., Inc., Fort Wayne, Ind. makers of pumps and water systems, has changed its name to Paul Pumps, Inc.

ELMER C. SALZMAN, vice-president in charge of sales for Robins Conveyors Inc., engineers, manufacturers and erectors of materials handling machinery, Passaic, N. J., recently arrived in Rio de Janeiro on company business. His visit, of about one-month duration, will take him to the property of the Rio Doce Mine where Robins is preparing a system for conveying iron ore. (*ENR* Dec. 30, 1943, vol. p. 954). Mr. Salzman will also visit the offices of Industrias Murray S. A., Rue da Constituicao 37, Rio de Janeiro, agents in Brazil for Robins Conveyors, Inc.

SHEFFIELD STEEL CORP. has announced the appointment of Alfred B. Egan as district manager at 310 So. Michigan Ave., Chicago, Ill.

Mr. Egan has been with Sheffield sixteen years. For many years he was in charge of the Des Moines office. Since 1942, he has been in charge of the Washington, D. C. office.

THE FOLLOWING new directors were elected at the recent annual stockholders' meeting of the LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Ia.; Alfred Kauffmann, former president and current director of the Link-Belt Co., Chicago; Roy Fruehauf, executive vice president, Fruehauf Trailer

Eager Beaver
Tireless... tough... tried and true... that's the long record of Barco Portable Gasoline Hammers wherever there's breaking, drilling, driving or tamping to be done. Eleven special tool attachments make Barco the most versatile of tools.
BARCO Portable Gasoline Hammers
The Free Enterprise System Is The Salvation of American Business

RCO MANUFACTURING COMPANY, NOT INC., 1814 Winnemac Ave., Chicago 40, Ill. • In Canada: The Holden Co., Ltd., Montreal, Can.

simplicity

In design, construction, and operation, Refinite equipment is the ultimate in simplicity, making for maximum efficiency, ease of operation, minimum maintenance cost.

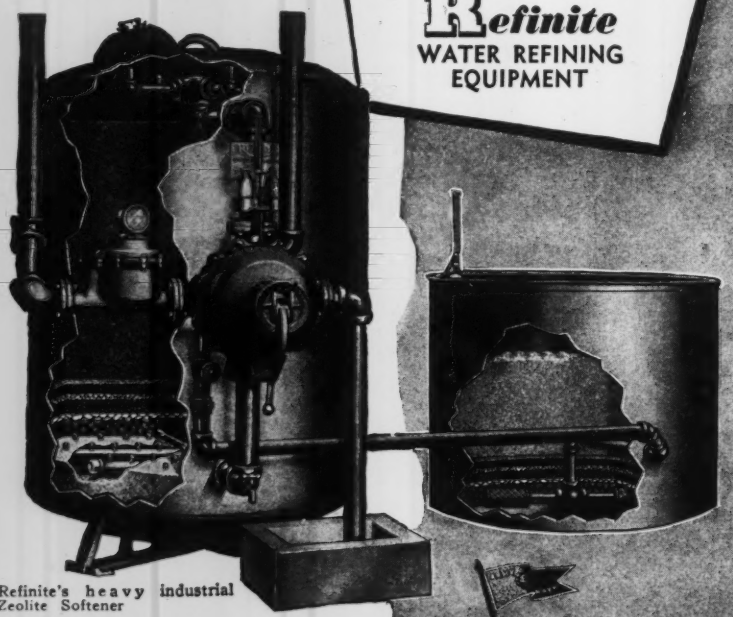
durability

Heavy construction, and highest quality materials go to make Refinite equipment a lifetime servant. Many of Refinite's first installations, over a quarter of a century ago are still giving efficient, economical service.

economy

Simplicity plus durability means economy . . . low operating cost, savings in manhours, in addition to the savings that Refinite Refined Water afford.

Refinite
WATER REFINING EQUIPMENT



Refinite's heavy industrial Zeolite Softener

The Refinite Corporation

102 REFINITE BLDG. OMAHA, NEBRASKA

TRACK HAULAGE IS CHEAPER HAULAGE

PLYMOUTH LOCOMOTIVES

• FROM 2½ TO 70 TONS •

PLYMOUTH LOCOMOTIVE WORKS

Division of The Fate-Root-Heath Co., PLYMOUTH, OHIO, U. S. A.

Co., Detroit; Howard Hall, pres. Iowa Manufacturing Co., and Iowa and Iron Works, Cedar Rapids. Owen N. Elliott, Cedar Rapids la Re-elected was Roy E. Choate, pres of the company since 192[illegible], and Coquillette, president of the Merc National Bank, Cedar Rapids. A D. Dennis, secretary-treasurer was named a director.

In announcing its new distrib policy, LaPlate-Choate stated it continue manufacturing earth-mo equipment for use with Caterpillar tors but that eventually its complete of equipment will be designed, built made available for use with other m of tractor-type and high speed rub tired tractors.

ARMCO spiral welded pipe is now ing sold through Armco Drainag Metal Products, Inc., Middletown, O a wholly-owned subsidiary of The A ican Rolling Mill Co. The new arra ment consolidates all Armco pipe fabricated product activities in one ganization. R. C. Beam is manage the welded pipe sales division. He merly headed the pipe sales divisio the parent company. R. E. Walker been made district manager of we pipe sales and will continue at T Okla.

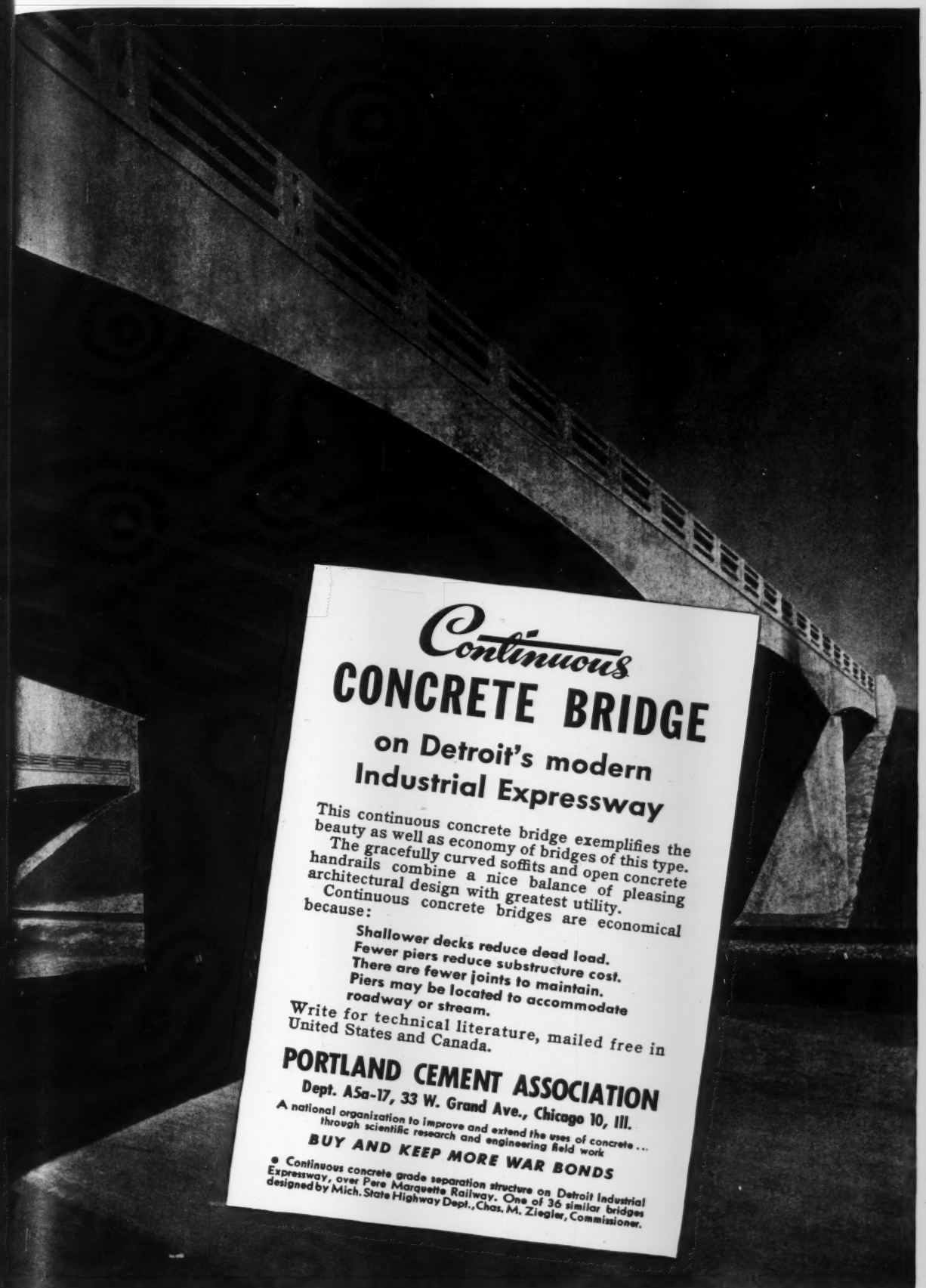
HAROLD R. BERLIN, since 1940 m ager of all industrial building mater has been named general merchan manager of building materials Johns-Manville Corp.

HARRY B. MCNIECE, sales manage Republic Stamping & Enameling Canton, Ohio, for the last seven ye has been promoted to vice-presid retaining his position as sales mana of the company.

GILBERT H. GAUS has recently b appointed manager of the Gardner-D ver Co's New York branch. He succeeds G. V. Leece, vice-president, now in charge of the export division.

Previous to joining the company in 1938, Mr. Gaus had 18 years' experience in engineering and sales in the New York area, on pumps other mechanical and electrical eq ment for industrial plants, power pl water works and sewage plants.

Mr. Gaus was graduated from Massachusetts Institute of Technol in 1917. He entered the Army and ing World War I was a 1st lieute in the Coast Artillery Corps.


Continuous
CONCRETE BRIDGE
on Detroit's modern
Industrial Expressway
This continuous concrete bridge exemplifies the beauty as well as economy of bridges of this type. The gracefully curved soffits and open concrete handrails combine a nice balance of pleasing architectural design with greatest utility.
Continuous concrete bridges are economical because:
Shallower decks reduce dead load.
Fewer piers reduce substructure cost.
There are fewer joints to maintain.
Piers may be located to accommodate roadway or stream.
Write for technical literature, mailed free in United States and Canada.
PORTLAND CEMENT ASSOCIATION
Dept. A5a-17, 33 W. Grand Ave., Chicago 10, Ill.
A national organization to improve and extend the uses of concrete ... through scientific research and engineering field work
BUY AND KEEP MORE WAR BONDS
• Continuous concrete grade separation structure on Detroit Industrial Expressway, over Pere Marquette Railway. One of 36 similar bridges designed by Mich. State Highway Dept., Chas. M. Ziegler, Commissioner.

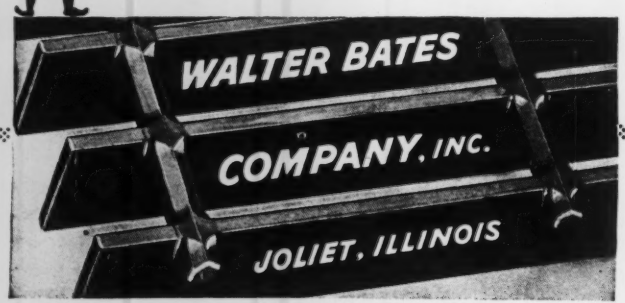
• *Mr. Fillet Weld* sees a lot of Mr. Sun. You see, *Mr. Fillet Weld* holds the Hex Cross Bars of BATES•GRATES to the main bars. In doing so, he allows maximum transmission of light and ventilation through the grating. The reflecting bevels of the Hex bars and 90° corners make this possible.

Good light and ventilation are important in every plant, as you well know.

that's only one reason why
BATES•GRATES are better

• The fact that BATES•GRATES allow more light and better air circulation is only one of the distinctive advantages of BATES. The Fillet Welded Hex Cross Bars make BATES stronger. The crisp, clean edges of Hex and main bars also give you sure-footed safety. They are easier to clean and maintain. All this adds up to:

Get a bid from BATES
on every job where you need GRATES



A. D. Cook, Inc., Lawrenceburg, Ind., announces the appointment of Robert W. Slee as general sales manager in charge of the pump, strainer and ejector divisions of the firm. Mr. Slee is a graduate engineer and has a thorough knowledge of pump markets, uses, applications and performance.

He headed Wiley-Slee Associates, Chicago, an engineering, sales and general contracting firm specializing in the sanitary field.

Mr. Slee will supervise the sales service and product development of deep well turbine pumps, well strainers and supplies and automatic water system units.

Chain Belt Co., of Milwaukee, Wis., has appointed Martin Machinery and Supply Co. as distributors of its line of construction machinery in the Knoxville, Tenn., area.

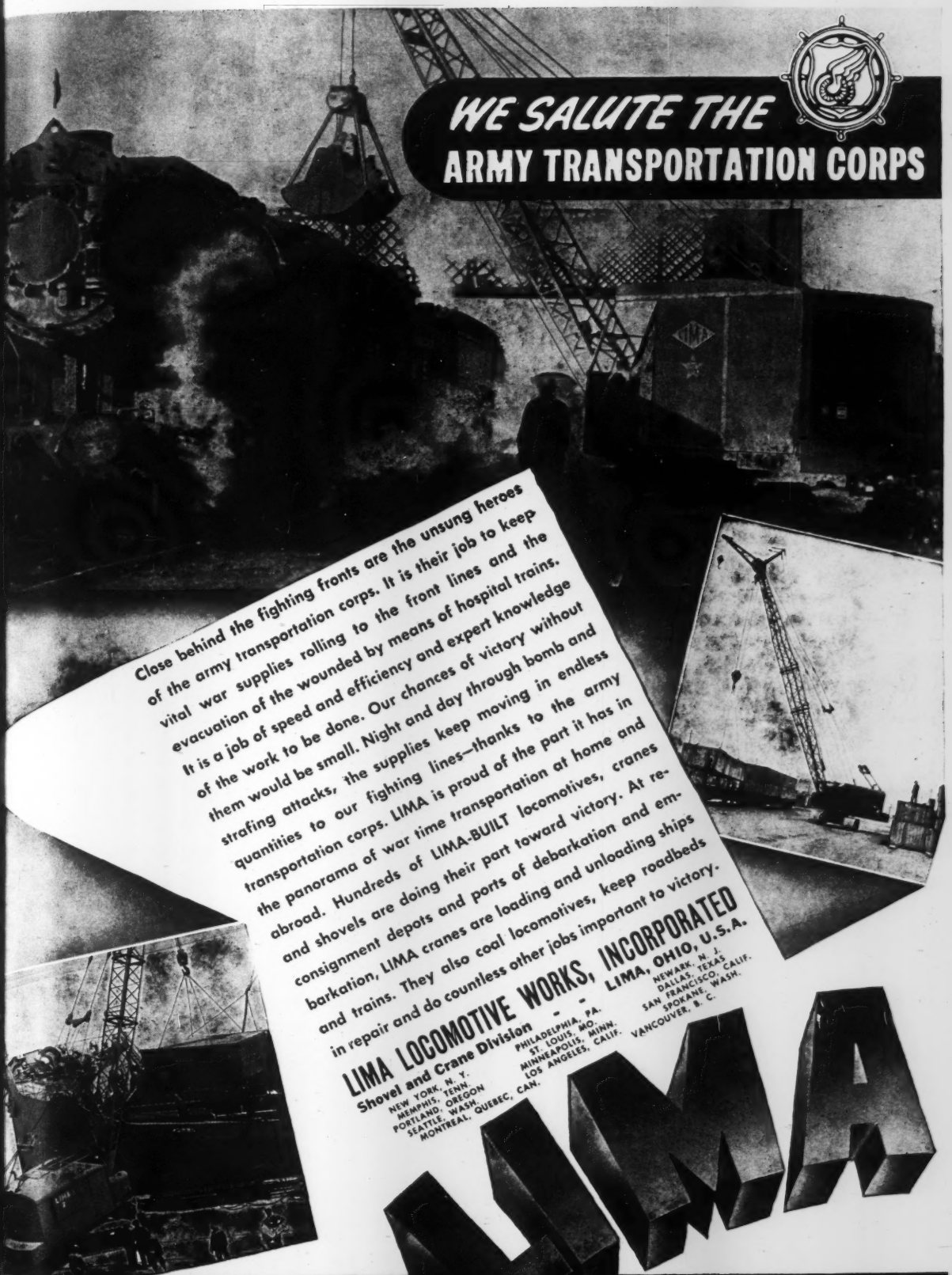
The organization is headed by Karl R. Martin. Associated with him are John Hay, L. C. Biggs, Houston Brown and Karl R. Martin, Sr. The line which Martin will distribute in that area includes mixers, plaster mixers, pumps, motor-mixers, pavers and a concrete pumping machine.

Builders Iron Foundry, and its affiliates, Builders-Providence, Inc., Proportioneers, Inc. and Omega Machine Co., Providence, R. I., recently held a triple celebration to commemorate the company's 125th anniversary, to honor 270 employees having from five to fifty-four years of service, and to celebrate the award of the fifth Army-Navy E just received by the concern.

Harry S. Dolbey, research and service man; Albert B. Coulters, New England representative; Peter Morrison, pattern maker; James B. Cook, core maker; Charles G. Richardson, vice-president and manager of municipal sales; and Thomas G. Healey, foundry foreman, received special congratulations, each having served over forty years.

Henry Barnhart, formerly manager of the shovel and crane division of Lima Locomotive Works, Lima, Ohio, is now vice president in charge of that division. He joined the sales force in 1928 as assistant sales manager. In 1936 he was made general sales manager of the shovel and crane division and in 1943 was promoted to manager of the division.

Albert Jay Townsend, chief mechanical engineer, has been appointed



WE SALUTE THE
ARMY TRANSPORTATION CORPS

Close behind the fighting fronts are the unsung heroes of the army transportation corps. It is their job to keep vital war supplies rolling to the front lines and the evacuation of the wounded by means of hospital trains. It is a job of speed and efficiency and expert knowledge of the work to be done. Our chances of victory without them would be small. Night and day through bomb and strafing attacks, the supplies keep moving in endless quantities to our fighting lines—thanks to the army transportation corps. LIMA is proud of the part it has in the panorama of war time transportation at home and abroad. Hundreds of LIMA-BUILT locomotives, cranes and shovels are doing their part toward victory. At re-consignment depots and ports of debarkation and em-barkation, LIMA cranes are loading and unloading ships and trains. They also coal locomotives, keep roadbeds in repair and do countless other jobs important to victory.

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division — LIMA, OHIO, U.S.A.
NEW YORK, N. Y. — PHILADELPHIA, PA. — NEWARK, N. J.
MEMPHIS, TENN. — ST. LOUIS, MO. — DALLAS, TEXAS
PORTLAND, OREGON — MINNEAPOLIS, MINN. — SAN FRANCISCO, CALIF.
SEATTLE, WASH. — LOS ANGELES, CALIF. — SPOKANE, WASH.
MONTREAL, QUEBEC, CAN. — VANCOUVER, B. C.

LIMA

SHOVELS -- CRANES -- DRAGLINES — a type and size for Every Job

FINE WATCH *Precision* plus
BULLDOZER RUGGEDNESS

MORE THAN DOUBLE PUMP LIFE

Building sustained efficiency into the mechanical structure of a pump was a problem solved by Peerless engineers.

Peerless engineering is *precision engineering* that permits *closer tolerances* which eliminate the customary vibration to an unusual degree. Thus, wear and tear are reduced; repair bills consequently are the lowest known.

The most vital parts of a Peerless Pump are *doubly* protected . . . by a *Double Seal* and *Double Bearings* . . . plus rugged construction . . . that more than double the productive life of the pump.

"Torture-chamber" tests in the Peerless hydro-mechanical laboratory disclose that the Peerless-featured, fully-enclosed impellers are little affected by sand-cutting and cavitation.

Capacities—10 to 220,000 gallons per minute

Peerless Distributors and Direct Factory Representatives are located in every State.

PEERLESS PUMPS TURBINE HI-LIFT HYDRO-FOIL
PEERLESS PUMP DIVISION
Food Machinery Corporation
301 West Avenue 26, Los Angeles 31, California
1250 Camden Avenue S.W., Canton 6, Ohio
Other Factories: San Jose 5, Fresno 16, California

vice president in charge of engineering. He received engineering training at the University of Michigan. He joined Lima in 1917 as calculator, and has served successively as chief calculator, mechanical engineer and chief mechanical engineer.

THREE APPOINTMENTS in the sales and advertising departments of The Philip Carey Manufacturing Co., Cincinnati, Ohio, building materials and industrial products, have been announced.

Harold D. Bates has been named advertising and sales promotion manager. He has had over 20 years experience with building materials and industrial products and was assistant advertising and sales promotion manager for Johns-Manville, New York.

Chester L. Owens has been named assistant general sales manager. He joined Carey as a salesman in 1927 and later served as branch manager at Omaha and Chicago. For the last ten years he has been manager of the Cincinnati branch.

George B. Johnston, who becomes general merchandising manager, was formerly manager of the marketing division. In his nineteen years with the organization, he has been manager of the contract department at Louisville and assistant branch manager at Chicago, Illinois.

THE UNION METAL MANUFACTURING Co. of Canton, Ohio, has bought certain assets of The Dual Parking Meter Co. Oklahoma City, Okla. The manufacture and repair of Dual meters will be done at Union Metal's main plant in Canton and at The Superior Switchboard & Devices Co., a local subsidiary of Union Metal in Canton. Sales and servicing will be handled by The Dual Parking Meter Co., Canton.

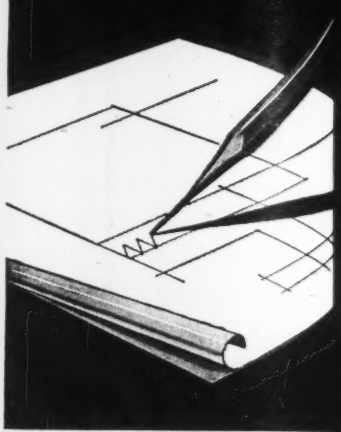
THE HURON PORTLAND CEMENT CO. of Detroit, Mich., has appointed C. L. Laude general sales manager and P. L. Biasell purchasing agent.

THE RICHMOND SCREW ANCHOR CO. announces the resignation of Martin E. Flaherty as secretary and district sales manager. Mr. Flaherty maintains his interest as a stockholder in the company.

STEVENS A. BENNETT has been elected a vice president of the United States Steel Co. subsidiary, the United States Steel Products Co., in charge of the Bennett Manufacturing Division, Chicago.

Russell H. Foss was recently appointed sales manager for the New York district of Hazard Wire Rope division of American Chain & Cable Co., Inc. Mr. Foss, with the company for 6 years, will continue at 230 Park Avenue, New York City.

TRACING CLOTH for HARD PENCILS



● Imperial Pencil Tracing Cloth has the same superbly uniform cloth foundation and transparency as the world famous Imperial Tracing Cloth. But it is distinguished by its special dull drawing surface, on which hard pencils can be used, giving clean, sharp, opaque, non-smudging lines.

Erasures are made easily, without damage. It gives sharp, contrasting prints of the finest lines. It resists the effects of time and wear, and does not become brittle or opaque.

Imperial Pencil Tracing Cloth is right for ink drawings as well.

IMPERIAL PENCIL TRACING CLOTH

SOLD BY LEADING STATIONERY AND DRAWING MATERIAL DEALERS EVERYWHERE

IN EVERY SERVICE U.S. TIRES EXCEL!

Today new tires are scarce. First call must go to our armed forces—you wouldn't have it any other way. That's why it's so important to make every tire mile count—by getting the *right* tire for every job—by giving your tires the kind of care they need to deliver *all* their built-in service. U.S. Heavy Service Tires are built to make every tire mile count. They are compounded and engineered to excel at their specific jobs. See your U.S. Truck Tire Dealer today. Ask him about U.S. Transportation Maintenance. He can help you keep your truck tires rolling.

Make every tire mile count TOWARD VICTORY!

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10,000,000 cu. yds. of Mass Concrete Placed by JACKSON VS-4s On TVA Dams Alone

VS-4s IN USE ON GRAND COULEE DAM

JACKSON

HEAVY DUTY INTERNAL VIBRATOR

Contractors eyeing the many dam projects proposed as part of the postwar construction program can rely on JACKSON VS-4 Mass Concrete Vibrators as the outstandingly efficient machines for thorough and speedy compaction of the harsh and stiff mixes used in this type of concrete construction. JACKSON VS-4s are noted for dependability and low cost maintenance, under practically continuous operation... Big jobs where JACKSON Mass Concrete Vibrators have made outstanding records include TVA Dams, Grand Coulee, Madden, Pine Canyon (Samuel B. Morris), Conchas and Tygart Dams, to name just a few. Experienced contractors and engineers on the huge postwar hydro-electric and reclamation programs will select JACKSON VS-4s because of their performance records.

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ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

Manufacturers' Publications

Diaphragm and Plunger Pumps—A complete pump catalog gives information concerning the following types of pumps: self-priming centrifugal, gasoline engine powered, portable; high pressure; electrically or belt driven diaphragm and plunger. There is also information on how to select the correct pump.—*Marlow Pumps, Ridgewood, N. J.*

Hose Couplings—A 44-page catalog describes and illustrates a wide variety of hose couplings for practically every application of hose service. They are made of malleable iron or alloy steel chosen to give the utmost flexibility and durability.—*Hose Accessories Co., Philadelphia* 32, *Pa.*

Castings in Industry—A large bulletin—127 pages—contains articles about castings from various trade publications. They are divided and indexed according to subject, ten main subject heads being covered.—*Meehanite Research Institute of America, Inc., Publishing Square Building, New Rochelle, N. Y.*

Subgraders—This bulletin describes a subgrader designed to meet the contractor's demand for lower subgrading costs and the engineer's requirements for finished subgrade. It is said that the company's engineers have incorporated into this equipment many exclusive features.—*Standard Steel,* 5001 *So. Boyle Ave., Los Angeles* 11, *Calif.*

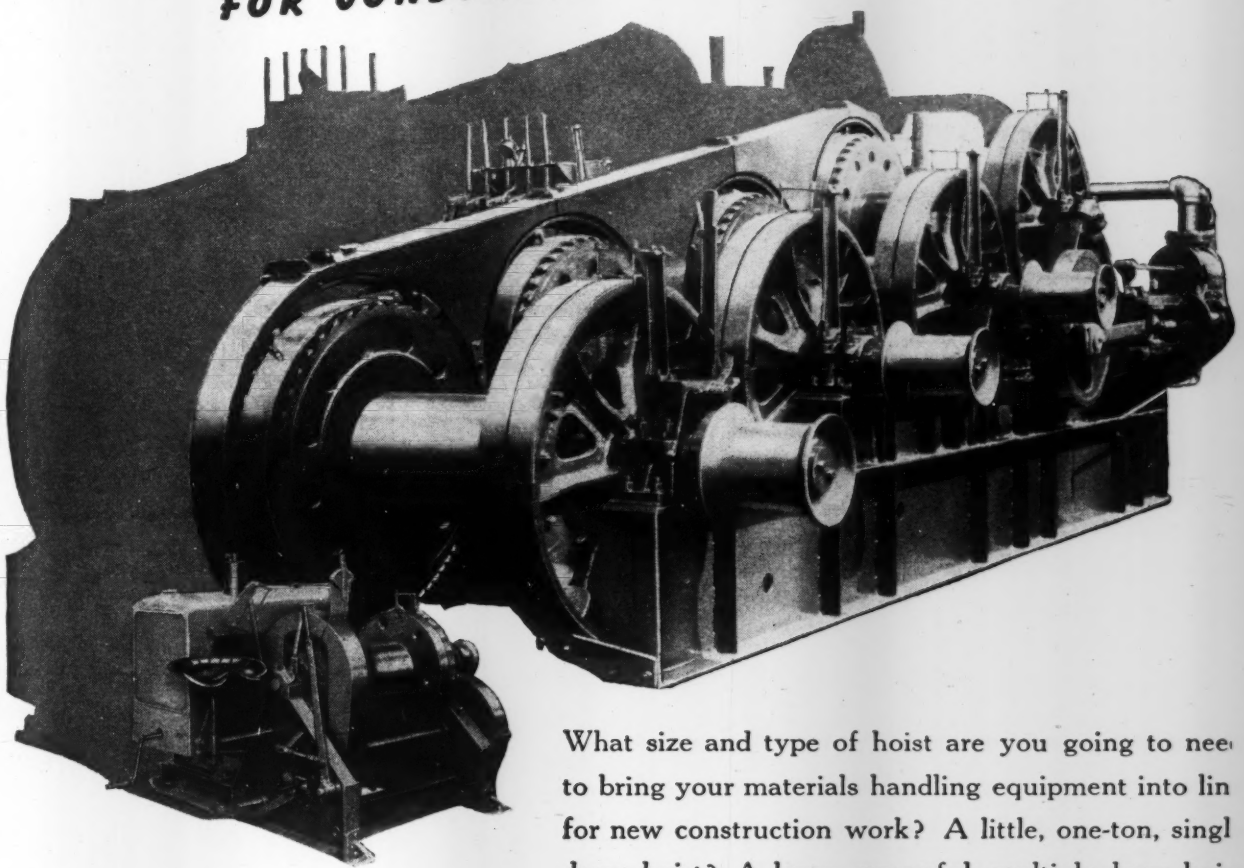
Diesel Tractors—A new book highlights many major contributions to the solution of power problems. The list includes the first successful track-type tractor, the first diesel tractor, the first motor graders with rear-mounted engines and power control. Performance records and profit figures are given on a wide range of jobs. Dealer service facilities are also featured.—*Caterpillar Tractor Co., Peoria, Ill.*

Elevators and Dumb Waiters—A 24-page booklet of standard specifications for elevators and dumb waiters will assist the architect and engineer in specification-writing. — *Sedgwick Machine Works,* 150 *West* 15*th St., New York* 11, *N. Y.*

Fluid Handling Equipment—A catalog describes a complete line of tested devices for the protection of

American HOISTS

FOR CONSTRUCTION MATERIALS HANDLING



What size and type of hoist are you going to nee to bring your materials handling equipment into lin for new construction work? A little, one-ton, singl drum hoist? A large, powerful, multiple-drum hois for 250-ton derrick work and larger? Or is it a hois somewhere in between? In the AMERICAN com plete line of hoists there is a proved, modern desig hoist for whatever your requirements in line pul speed, type of power, and operating convenienc

Now is the time to look into your hoist requirement

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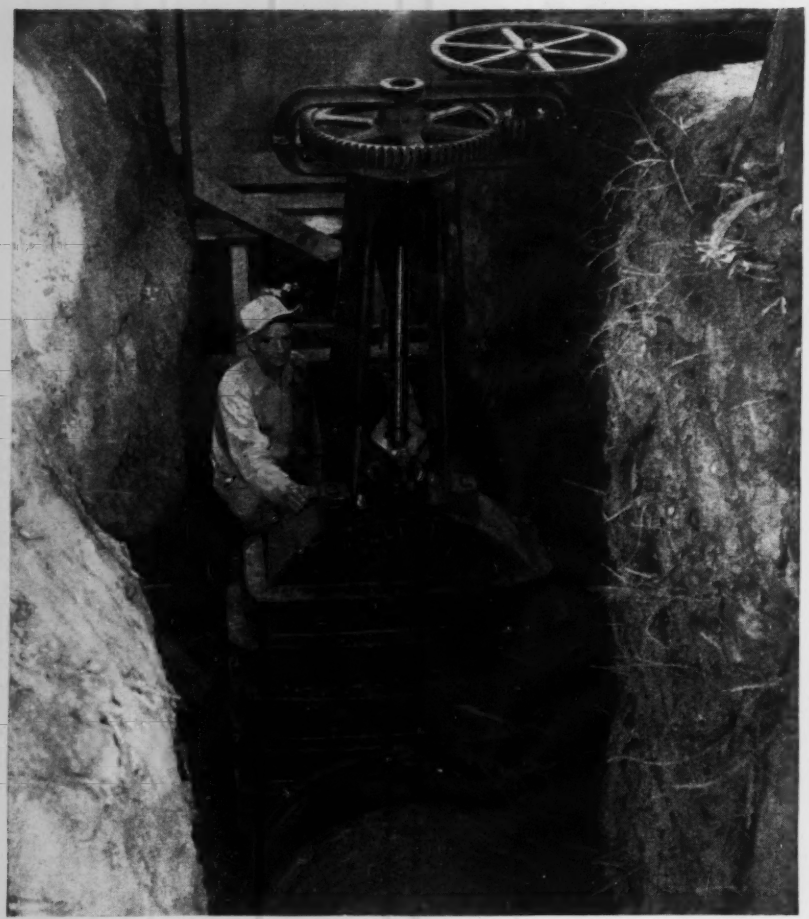
Wherever wire rope is fastened . . . . use genuine **CROSBY CLIPS** *with the Red-U-Bolt*



DO YOU NEED A GATE VALVE?

Here is an actual photograph of a typical gate valve installation in a water works improvement project. This point in the piping system is a key spot that called for a valve that would be ready for instant operation anytime day or night when emergencies or special needs arose. There dared not be any failures when the valve had to be used. It is significant that a MUELLER-COLUMBIAN valve was chosen—not only for this spot, but for all the other places where new valves were needed in the system.

Any water works man who knows valves will tell you that MUELLER-COLUMBIAN Gate Valves last for generations. The EXCLUSIVE 4-point wedging mechanism of the gate assembly is the heart of this valve. There are only six simple parts which, by means of the wedging principle employed, apply the pressure of closing to the outer edges of the discs at four equal points. There can be no sprung or warped discs and therefore no leaks. The ball-joint design of the packing gland and follower positively prevents binding of the stem at anytime. The disc and seat rings and all vital working parts are of everlasting MUELLER bronze. The close-grained gray iron bodies have extraordinary thickness of section for the indicated pressure. The result is a valve that will operate for years with a minimum of attention and negligible maintenance costs. . . Get the valve that engineers specify—the valve water works men prefer. Demand MUELLER-COLUMBIAN. Write for our latest folder that gives the full facts in condensed form for quick reading.

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erating equipment in piping systems of industrial, processing and power plants. Other products described are interceptors for grease, wax, fats, oils, lint and solids such as metals, plastics, glass, etc. in vents, valves and drains.—*J. H. Zurn Mfg. Co., Erie, Pa.*

Air-operated Tools—A pocket-size folder illustrates air tools on construction, demolition and plant maintenance jobs. Several of these show new uses for well-known tools. Various accessories to air-tool operation are also shown, such as hose couplings, air line lubricators, steels and jackbits.—*Ingersoll-Rand,* 11 *Broadway, New York* 4, *N. Y.*

Building Materials—Issued for engineers and architects, this bulletin states that there is little likelihood that plastics or new metals will be substituted for standard structural building materials in the early postwar years. Among the products presented are new modular sizes of metal windows, new designs in bathroom fixtures made from non-critical vitreous materials, improved methods of baseboard panel radiation, awning type windows, and standard sizes of household shower cabinets.—*The Producers' Council, Inc.,* 815 *15th St. N.W., Washington* 5, *D. C.*

Blast Cleaning—A new 24-page booklet featuring 21 unusual problems in blast cleaning that required special "made to measure" equipment for production handling is being distributed. Almost every known method of handling metals to be processed is represented. The pictures are large and numerous.—*Pangborn Corp., Hagerstown, Md.*

Ball and Roller Bearings—A manual contains standard specification data on the manufacture of ball and roller bearings covering various types of bearings, a uniform basic part number system, suggestions on standardized workmanship, inspection and tests, and a simplified form of tabulated dimensional data. These data have been prepared to eliminate many separate specifications and to assist designers in the application of standard bearings.—*Ball & Roller Bearing Information Center,* 16 *East 48th Street, New York* 17, *N. Y.*

Oxy-acetylene Pipelines—An 84-page book gives a comprehensive review of the entire subject of the production of calicum carbide and acetylene gas and the equipment needed for oxy-acetylene distributing systems—replete with illustrations, charts, and easily read engineering data. It answers all pertinent questions. This company has also issued a new apparatus catalog.—*Victor Equipment Co.,* 844-54 *Folsom St., San Francisco, Calif.*

How Mayari R stacks up

Stacks built of Mayari R, Bethlehem's high-strength, low-alloy steel, are showing excellent performance, year after year, in resisting corrosive fumes and gases which resulted in early failure of the ordinary carbon steel stacks which they replaced.

Mayari R has other outstanding advantages. It makes possible lighter construction, with reduction in dead weight up to 40 per cent, because its yield point is nearly twice that of mild carbon steel. And it is ductile and exceptionally weldable—hence is readily fabricated under ordinary shop practices.

Get the facts on Mayari R, which is available in sheets, strip, shapes, plates and bars. Just write to Bethlehem Steel Company, Bethlehem, Pa., for booklet giving complete information.

PHYSICAL PROPERTIES OF MAYARI R

Ultimate tensile strength p. s. i.	70,000 min.
Yield point, p. s. i.	50,000 min.
Elongation in 2 in. per cent min.	22
Endurance limit, p. s. i.	50,000
Endurance ratio	0.70
Modulus of elasticity	28-30,000,000

BETHLEHEM STEEL

Mayari R *makes it lighter... stronger... longer lasting*

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THERE is a type of cab and body for any service, in any climate. The built-in strength and balance, with ample power, permit the rugged Linn Haftraks to carry their loads in all kinds of weather—the world around, the year around. Linn Haftraks and Traktrailers are built from 5 to 50 tons capacity. Send for catalog.

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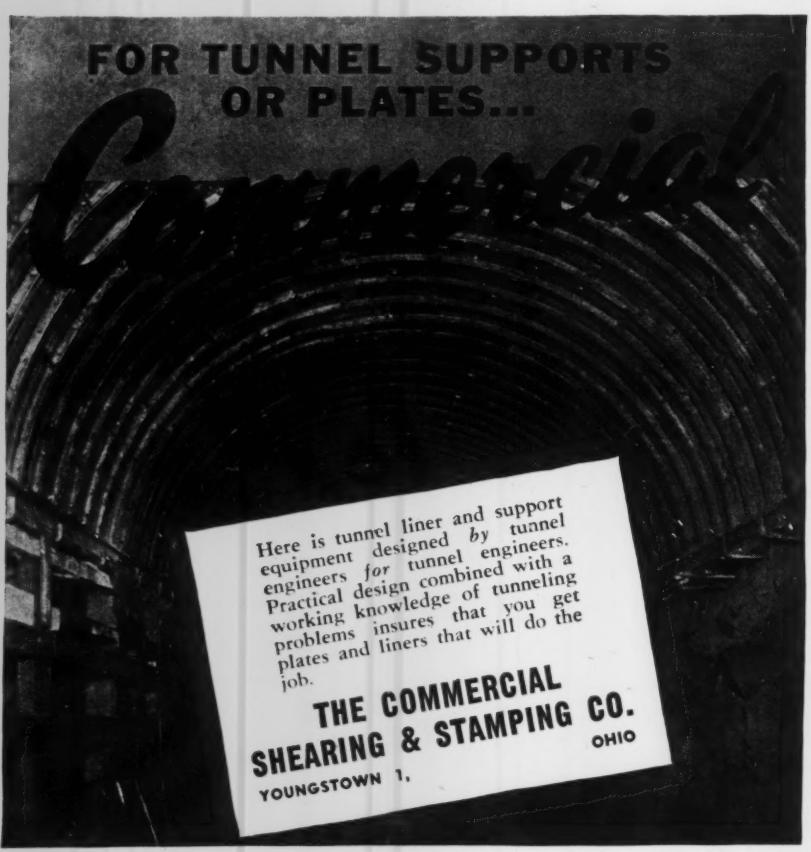
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Here is tunnel liner and support equipment designed by tunnel engineers for tunnel engineers. Practical design combined with a working knowledge of tunneling problems insures that you get plates and liners that will do the job.
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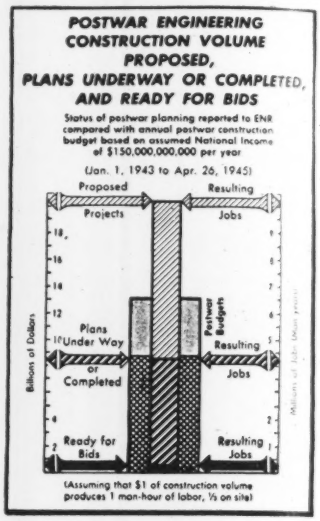
POSTWAR PROJECTS


POSTWAR ENGINEERING CONSTRUCTION VOLUME PROPOSED, PLANS UNDERWAY OR COMPLETED, AND READY FOR BIDS
Status of postwar planning reported to ENR compared with annual postwar construction budget based on assumed National Income of $150,000,000,000 per year
(Jan. 1, 1943 to Apr. 26, 1945)
Proposed Projects
Resulting Jobs
Billions of Dollars
Postwar Budgets
Plans Under Way or Completed
Resulting Jobs
Ready for Bids
Resulting Jobs
(Assuming that $1 of construction volume produces 1 man-hour of labor, ½ on site)

Projects proposed for postwar construction have been published in these columns since January, 1943 as they have been reported to ENGINEERING NEWS-RECORD.

Statistics based on these reports are used by the Committee on Postwar Construction of the American Society of Civil Engineers to measure the progress of plans for postwar projects.

The chart above shows, both in estimated dollar volume and in jobs or man-years of labor, how fast this reservoir of future work is filling up.

WATER SUPPLY

PROPOSED WORK

Calif., Exeter—City, City Hall, replacing watermains. **$50,000.**

★ **Ind., Fort Wayne**—City, City Hall, WW plant addn. **$600,000.**

La., Kaplan—Mayor and Alderman of Kaplan, City Hall, WW imprvs., incl. watermain exten., enlargement of town's sewerage sys. **$100,000.** Financing not provided.

Wash., Yakima—City, City Hall, exten. water distr. sys. to Nob Hill Dist. $70,000. Financing not provided.

Ont., Victoria Harbour—Municipality, c/o W. Lumsden, Town Hall, WW sys. **$40,000.**

Que., Atwater—Atwater Twp., Atwater, water sys. **$30,000.**

Que., Booth—Booth Twp., Booth, WW sys. Over **$25,000.**

Que., Campeau—Campeau Twp., Campeau, WW sys. **$30,000.**

Que., De Sales—De Sales Twp. De Sales, WW sys. **$25,000.**

Que., LaCoste—Lacoste Twp., Lacoste, WW sys. **$30,000.**

Que., McLachlin — McLachlin Twp., McLachlin WW sys. Over **$25,000.**

Que., Mortagne—Mortagne Twp., Mortagne, WW sys. **$30,000.**

PLANS UNDER WAY

Calif., Modesto—City, City Hall, defeated bonds, imprv. water sys. **$100,000.** P. J. Rossi, City Hall, city engr. CD 2/20—ENR 3/8.

Conn., Norwich — City, M. Kane, supt. Water Dpt., Norwich, 2 story, brick, concrete filtration plant, constructing water filtration facilities, Deep River Reservoir. **$300,000.** Financing not provided. Buck Seifort & Jest, 112 E. 19 St., New York, N. Y., consult. engrs.

Ill., New Carbondale—Dpt. P. Wks. & Bldg., Div. Parks & Memorials, plans completed exten. water sys., in Giant City National Park. **$21,000.** Financing not provided. C. Herrick Hammond, Div. Architecture and Engr., Armory Bldg., Springfield, state archt.

Mass., Kingston—Town, Bd. Water Comrs., Town Hall, water supply sys. **$100,000.** Financing not provided. Hayden, Harding & Buchanan, 662 Park Sq. Bldg., Boston, consult. engrs.

Mass., Rowley—Town, Water Dpt., Town Hall, plans under way water supply sys. **$190,000.** Whitman & Howard, 89 Broad St., Boston, consult. engrs. CD 3/19—ENR 4/5.

Preformed wire rope

MULTIPLIES MANPOWER 3 WAYS

Men who actually work with wire rope prefer preformed. They give many different reasons for this choice, but the net result is more work per line before replacement.

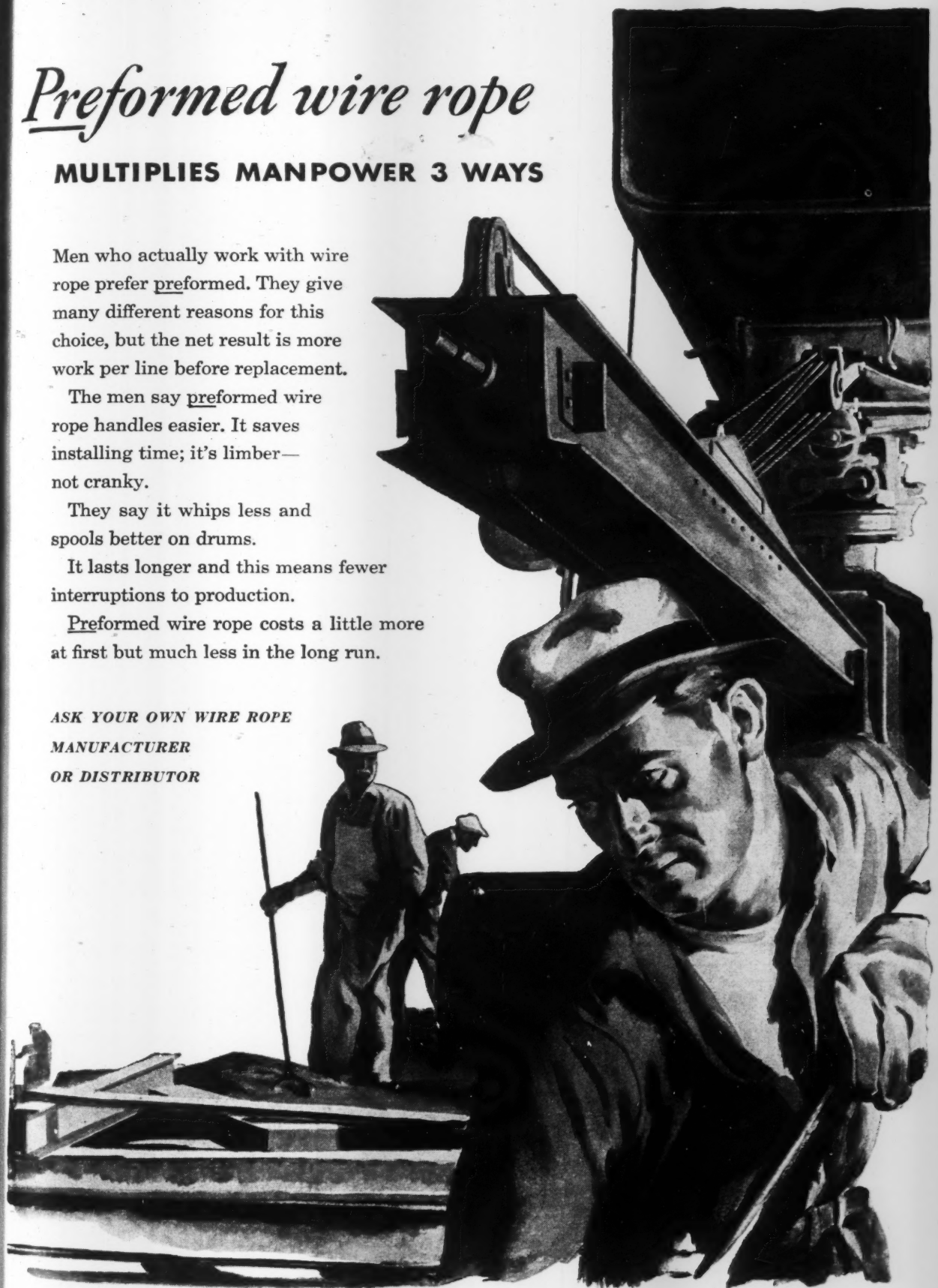
The men say preformed wire rope handles easier. It saves installing time; it's limber—not cranky.

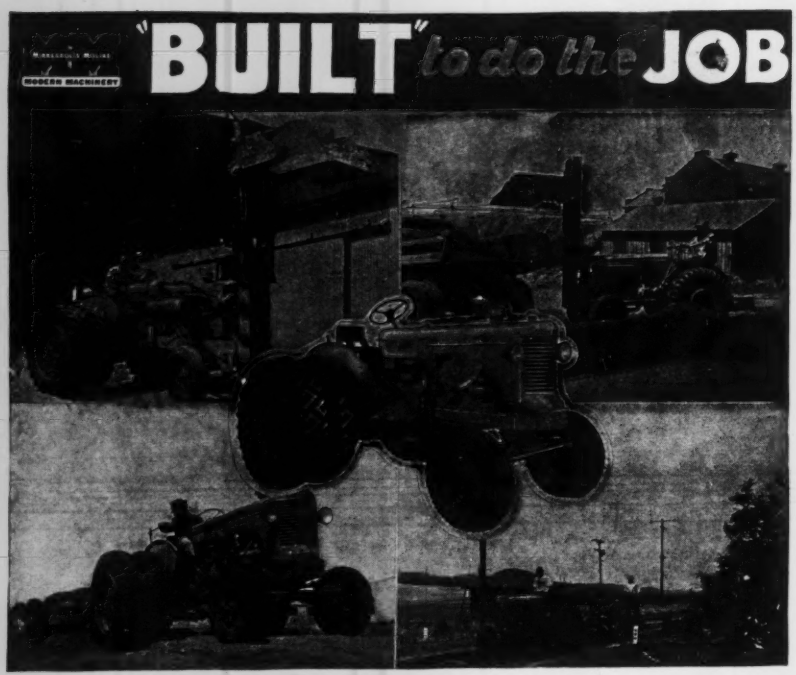
They say it whips less and spools better on drums.

It lasts longer and this means fewer interruptions to production.

Preformed wire rope costs a little more at first but much less in the long run.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR





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"Know-How" are small words but they have a ***big meaning*** in the manufacture of ***industrial tractors.*** "Know-How" and "Built to do the Job" are synonymous in building ***MM Industrial Tractors.*** The dependability, durability and low operating cost of MM Industrial Tractors is widely known. MM Industrial Tractors are built not only to pull graders, scrapers, packers and tampers but are also versatile enough to be adapted to loaders, cranes, snowplows and bulldozers. The short turning radius, good traction, high road speed, heavy-duty engines, special heavy-duty front axles, steering gears and counter weights make them ideal to "fit in" on the hundreds of jobs in any road or highway program. MM Industrial Tractors have a power range of from 27 to 64 brake HP on 70 octane gasoline and are built for ***real power without sacrificing*** operating economy and long life performance.

MODEL	ENGINE	BRAKE HP ON 70 OCTANE GASOLINE	FORWARD SPEEDS	MILES PER HOUR
RTI	3⅜ x 4-4 cyl.	27	4	2 to 11
UTI	4¼ x 5-4 cyl.	48	5	2.2 to 18
GTA-I	4⅝ x 6-4 cyl.	64	4	2.5 to 10

MINNEAPOLIS-MOLINE POWER IMPLEMENT COMPANY
MINNEAPOLIS 1, MINNESOTA, U. S. A.

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NEW FULL VISION CAB
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Powerful, fast-stepping Mobile Crane . . . one-man operated . . . for "on and off" highway operations . . . simple to operate . . . (eliminates cut-up terrain, mutilated concrete decks and runways.)
UNIT CRANE & SHOVEL CORP. MILWAUKEE 14 WISCONSIN

POSTWAR PROJECTS (Cont'd.)

O., Celina—Village, F. D. Kuck[illegible] mgr., City Hall, preliminary plans completed water treatment plant, **$180,000.** [illegible] Pettis & Strout, 1010 Home Bank Bldg., Toledo, Zone 4, consult. engrs.

Okla., Wagoner—City, E. O. Smith, mayor, City Hall, plans 10% completed WW extens. **$75,000.** Financing not provided. [illegible] Craig, Philtower Bldg., Tulsa, consult. engrs.

Ore., Salem—City, City Hall, 10 mg. reservoir, **$175,000.** Financing not provided. J. H. Davis, City Hall, city engr.

Tex., Beaumont — PORT FACILITIES—City, F. Stone, mayor, City Hall, expansion municipal port facilities. **$100,000** or more. Financing not provided.

★ **Tex., Galveston**—City, plans under way, 30 in. water distr. main between Alta Loma and Galveston mainland, **$1,500,000**; imprv., enlarging, extend. WW sys., **$600,000.** Bond election May 8. J. J. Rady, [illegible] Insurance Bldg., Fort Worth, consult. engr. CD 10/5—ENR 10/19.

N. B., Woodstock — Municipality, extens. water sys. **$40,000.** C. W. Gorman, Town Hall, engr.

N. S., Amherst—Municipality, storage works increasing municipal water supply, treatment and filtration of water supply, revamping present distr. sys. **$90,000.** F. C. Wightman, Town Hall, engr.

Ont., Stratford—Municipality, preliminary sketches made water facilities exten. **$50,000.** W. H. Riehl, City Hall, ensr.

READY FOR BIDS

Tex., Beaumont—City, F. Stone, mayor, City Hall, plans completed repairs and imprvs. on Fresh Water Canals bringing water to City WW, over **$80,000.** Financing provided.

Ready for Bids

Of $17,000,000,000 of proposed postwar construction at beginning of 1945 only $550,000,000 was reported "ready for bids", plans complete and financing available.

If you have projects "ready for bids", please send them in to be added to the total above to give a measure of the materials that will be needed to relax restrictions and go ahead with civilian work.

Send ready-for-bids projects news to Elsie Eaves, Manager Business News Department, Engineering News-Record, 330 W. 42 St., New York 18, N. Y.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Ill., Urbana—University of Illinois, Urbana, part of 25 year program, sewerage sys. addns. **$42,000.** Financing not provided.

Ind., Franklin—Bd. P. Wks., Wm. V. Hemphill, chn., Franklin, sewage treatment plant and sewerage sys. **$300,000.**

Mo., Clayton (St. Louis, 5, P.O.)—City, A. H. Kerth, mayor, City Hall, 10 North Bemiston St., voted bonds, sewers and acquiring right-of-way, **$250,000;** incinerator **$50,000.**

Mo., Richmond Heights (St. Louis, 17, P. O.)—B. W. LaTourette, mayor, bond election May 8, sewers and rights-of-way, **$100,000.**

Ont., Victoria Harbour—Municipality, c/o W. Lumsden, Town Hall, sewerage sys. **$60,000.**

PLANS UNDER WAY

Ala., Ensley (Sta. Birmingham)—Bd. Comrs., Jefferson Co., Birmingham, sewage plant. Polk, Powell, & Hendon, Chamber of Commerce Bldg., Birmingham, consult. engrs.

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Complete Pump Units Serve San Diego

. . . in New Sewage Disposal Plant

SAN DIEGO, CALIFORNIA, has placed the undivided *responsibility* for its sewage pumping problem on Fairbanks-Morse Pumps. Photo shows the battery of seven sewage pumps—1,000 to 10,000 g.p.m. —which will handle 46 million gallons per day in the new plant. Fairbanks-Morse Vertical Shaft Motors drive these pumps from the floor above. To date the plant is handling up to 26 million gallons a day at a cost of less than $15 per million.

Another city has discovered the advantages of installing Fairbanks-Morse Pumps.

For Fairbanks-Morse Pumps—complete with pump, driver, and base—offer these three vitally important advantages in addition to lasting efficiency:

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Successful UNIT Performance—Tested in one plant under expert engineering supervision, pumps and drivers assure a superior result to the buyer.

Service from One Source—One engineer is familiar with entire installation—no question of who makes adjustments or required repairs.

To benefit from this undivided responsibility, consult a Fairbanks-Morse engineer. There is no obligation. Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

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POSTWAR PROJECTS (Cont'd.)

★**Calif., Modesto**—City, City Hall, defeated bonds, sewerage sys. **$600,000.** F. Rossi, City Hall, city engr. CD 3/19—ENR 4/5.

★**Idaho, Boise**—City, E. W. Little, chn. City Planning Bd., City Hall, plans under way sewage disposal plant, **$600,000.** Financing not provided. L. R. Stockman, Baker consult. engr. J. B. McBirney, City Hall, city engr. CD 12/4—ENR 12/14.

Ind., Plymouth—Bd. P. Wks., J. A. Brenman, mayor and chn., Plymouth, preliminary plans under way sewage treatment plant and sewerage sys. **$200,000.** Chas. W. Cole & Sons, 226 W. LaSalle St., South Bend, consult. engrs.

Ind., Vincennes—Bd. P. Wks., N. P. Barr, chn., City Hall, sewage treatment and garbage disposal plant, interceptor sewers, **$350,000.** Wm. F. Reinke, City Hall, city engr.

★**Mich., Detroit**—Wayne Co., 3800 Barlum Tower, plans 10% completed drainage sewerage sys. serving southwestern part of Wayne Co., Inkster, Wayne and Dearborn Twps., from River Rouge to Wayne Co. airport, incl. trunk sys. serving twps. for sanitary service, **$6,000,000.** LeRoy C. Smith, 3800 Barlum Tower, Detroit, co. engr. CD 9/12—ENR 9/21.

★**Okla., Oklahoma City**—City, City Hall, plans 5% completed new outfall sewer serving Dennison Park, Putnam Heights and Crown Heights Addn. and lead to Deep Fork Alley. **$600,000.** Financing not provided. R. Lee, Jr., City Hall, engr.

Okla., Tulsa—City, City Hall, plans 10% completed addnl. storm water sewers, **$250,000.** Financing not provided. D. W. Patton, City Hall, city engr.

Okla., Wagoner—City, E. O. Smith, mayor, City Hall, plans 10 completed sanitary sewer exten., **$60,000;** sewage disposal plant **$70,000.** Financing not provided. Wood & Craig, Philtower Bldg., Tulsa, consult. engrs.

Ore., Medford—City, F. Rogers, supt., City Hall, plans completed exten. sewage disposal plant, **$200,000;** East Medford interception sewer, **$80,000.** Financing not provided. John W. Cunningham & Associates, Spalding Bldg., Portland, consult. engrs. CD 2/27—ENR 3/8.

Pa., Smethport—Council, Smethport, sewerage sys. **$150,000-$200,000.** Chester Engineers, 210 E. Park Way, Pittsburgh, consult. engrs. CD 2/16—ENR 3/22.

Pa., Warren—Boro of Warren, M. L. Daugherty, secy., Boro Hall, plans under way sewerage treatment plant, **$175,000.** Financing not provided. J. N. Chester Engineers, 210 E. Park Way, Pittsburgh, consult. engrs. C. W. Barwis, Warren, boro engr. CD 9/23—ENR 3/8.

Tex., Crane—Town, plans 25% completed sanitary sewers, **$60,000.** Vote bond issue Apr. 21. Koch & Fowler, Great National Life Bldg., Dallas, consult. engrs. CD 2/5—ENR 2/22.

Tex., Galveston—City, City Hall, plans under way sanitary sewer facilities (limited) **$100,000** bond election May 8. J. J. Rady, Insurance Bldg., Fort Worth, consult. engrs.

Wash., Bremerton—City, City Hall, plans 70% completed Capitol Hill sewer. **$70,000.** Financing not provided. E. S. Severance, City Hall, city engr. CD 9/29—ENR 10/19.

Wash., Hoquiam—City, City Hall, constructing, reconstructing storm sewers, **$250,000.** Financing provided. W. L. Lovejoy, City Hall, city engr.

N. B., Woodstock—Municipality, sewerage sys. exten. **$50,000.** G. W. Gorman, Town Hall, engr.

N. S., Amherst—Municipality, addnl. sanitary sewers, storm sewer lines. **$75,000.** F. C. Wightman, Town Hall, engr.

Ont., Picton—Municipality, complete sanitary sewage sys., disposal works, etc., over **$100,000.** J. B. Donkley, Picton, and James Proctor & Redfern, Ltd., Excelsior Bldg., Toronto, engrs.

Ont., Stratford—Municipality, preliminary sketches made sewer extens. **$50,000.** W. H. Riehl, City Hall, engr. CD 9/29—ENR 10/5.

READY FOR BIDS

Wis., Cudahy—City, J. F. Keller, clk., plans completed storm and sanitary sewerage sys. **$93,000.** H. C. Webster & Son, 739 N. 2 St., Milwaukee, Zone 3, consult. engrs. CD 2/9—ENR 2/22.

BRIDGES

PROPOSED WORK

Conn., Milford—Town, H. M. Merwin, first selectman, Town Hall, River St., reconstructing Maple St. Bridge, $30,000; bridge replacing Gulf St. Bridge, $110,000. Financing not provided.

★**Tex., Fort Worth**—City, City Hall, widening W. 7 St. bridge; exten. North Maine St. Bridge over Marine Creek; 30 and 35 St. bridges over Marine Creek; Sycamore Creek Bridge, Ramsey St., grade separations $450,000.

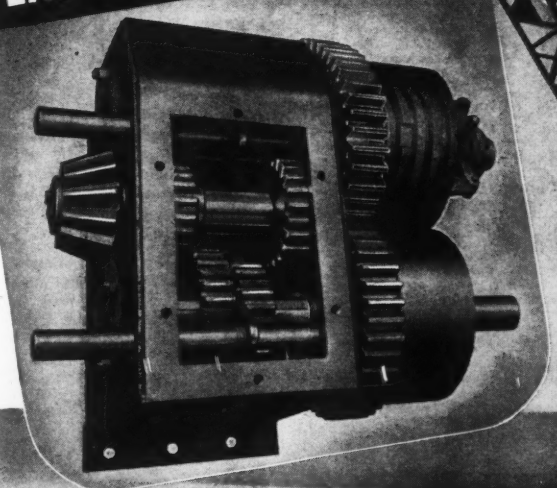
MAJOR ASSEMBLIES QUICKLY REMOVABLE

● Major machinery units on the new Koehring 205 are quickly and easily removed. No need to disconnect other assemblies when only the drumshaft, or the boom hoist, or the traction gear case, needs attention. Lift out only the part you want for convenient bench work. For major overhauls, the entire machinery support frame lifts off . . . as a unit . . . with all the machinery that's attached to it.

Typical of the quickly removable major machinery units of the new Koehring 205 is the independent traction unit, the assembly that makes possible the 205's independent travel while swinging, hoisting, raising or lowering the boom. The entire assembly can be lifted out without disconnecting any of the other main operating units.

205
HALF-YARD

UNIT CONSTRUCTION FOR EASY ACCESSIBILITY



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MILWAUKEE 10, WISCONSIN

Orders Accepted Now for Postwar Delivery

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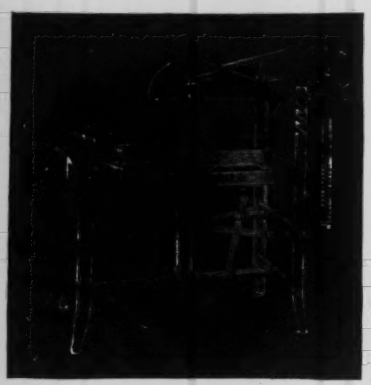
ARMY-E-NAVY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

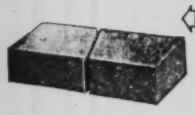
FASTER CUTTING
...with
Clipper Masonry Saws

Your Special Size and Shape Brick or Tile can now be "Tailor-Made" at a moment's notice!



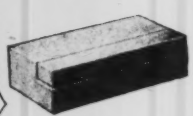
The new Clipper Multiple Cutting Principle makes possible faster cutting of every masonry material regardless of hardness.

Here are a few typical examples of the speed and accuracy with which fire brick can be cut for furnace repairs.



This acid brick intended for a chemical plant acid chamber was cut completely in two, in 37 sec.

One of many intricate cuts performed on first quality clay brick for heat treating furnaces. Made in 8 seconds.



Silica brick cut lengthwise for open hearth furnace work, only 9 seconds were required to complete this cut!

Basic refractories for steel furnaces or cement kilns must be accurately installed. This magnesite brick was cut in 12 seconds!

Clipper Saws are available for trial. Write for Descriptive Catalogs.

THE Clipper MANUFACTURING COMPANY

4016 MANCHESTER
ST. LOUIS, MISSOURI

POSTWAR PROJECTS (Cont'd.)

Que., Ville St. Pierre (Postal Dist. Montreal)—Montreal Tramway Co., Craig St., Montreal, elimination of railway crossing between Mercier Bridge and Ville St. Pierre, **$150,000.**

PLANS UNDER WAY

Calif., San Mateo—City, City Hall, defeated bonds imprv. bridge, San Mateo Dr., **$45,000.** W. D. Soule, City Hall, city engr. CD 3/19.

★ **Ill., Chicago**—City Dpt. P. Wks., Div. Bridges & Viaducts, City Hall, S. Damen Ave. Viaduct, Pershing Rd. and 43 St., **$1,800,000;** preliminary plans under way W. 16 St. Bridge and viaduct, 2 leaf bascule steel bridge, 170 ft. span, 44 ft. roadway, **$2,500,000.** Financing not provided. W. W. DeBerard, City Hall, city engr. S. Michuda, City Hall, engr of Bridges and Viaducts.

★ **Ill., Chicago**—City, Dpt. P. Wks., Div. Spec. Imprv., 139 N. Clark St., Kenton Ave. underpass from 39 St. to W. Marquette Rd., elevating 3½ mi. Belt Railway's tracks, **$2,605,000.** Financing not provided. A. Engh, 130 N. Clark St., ch. engr. Div. Spec. Imprv.

Ill., Springfield—Sangamon Co., Springfield, plans completed 3 span deck bridge with concrete piers and concrete piles over Sangamon River, State Aid Route 12, **$196,000.** Financing provided, land rights not cleared. R. Tilley, 316 N. Klein St., Springfield, co. engr. and supt. Roads.

Massachusetts—State Dpt. P. Wks., and Postwar Highway Comn., 100 Nashua St., Boston, plans completed constructing 0.6 mi. bridge over railroad on Route 12 at Sterling Junction, Sterling, **$190,000;** constructing 0.4 mi. bridge over Manhan River on Route 10, Easthampton, **$55,000;** 0.2 mi. First Street R.R. Bridge and approaches, Pittsfield, **$55,000;** elimination of 0.5 mi. Cuff's Grade Crossing by relocation of highway, Montague, **$20,000;** elimination 0.3 mi. R.R. grade crossings, Route 202, Templeton, **$120,000.** Land rights not cleared, legal obstacles to be overcome, and financing not provided.

New Hampshire—State Hy. Dpt., Concord, plans completed bridge, approaches, in Conway, Carroll Co. **$158,000.** Land rights not cleared. H. E. Longley, Concord, bridge engr. CD 8/2—ENR 8/24.

O., Celina—Mercer Co., Celina, plans 25% completed miscellaneous bridge replacement, **$50,000.** Financing not provided. Z. M. Flaler, Celina, co. engr.

O., Youngstown—Comrs., Mahoning Co., Court House, plans 95% completed Credit Mobilier Bridge over Mahoning River, main span, through truss, approach spans girders, **$250,000;** plans 50% completed continuous steel girder spans over Mahoning River rein.-concrete deck, **$150,000;** plans 20% completed main span, truss, approach spans over R.R. and underpass steel girder, steel grid floor, street widening on approaches, **$1,000,000.** Land rights not cleared. Wilbur Watson & Assoc., 4614 Prospect Ave., Cleveland, O., consult. engrs.

Okla., Oklahoma City—City, City Hall, plans 5% completed viaduct over Rock Island tracks at Exchange replacing existing condemned structure, **$200,000;** plans 10% completed concrete bridge over North Canadian River at Pennsylvania Ave. replacing light weight steel span, **$100,000.** Financing not provided. R. Lee, Jr., City Hall, city engr.

N. S., Liverpool—Municipality, in association with Dpt. Hys., Halifax, bridge across Mersey River, **$200,000.** W. D. Dechman, Town Hall, engr.

Que., Ville St. Pierre (Postal Dist. Montreal)—Canadian National Ry., H. A. Dixon, ch. engr., 360 McGill St., Montreal, subway eliminating railway crossing on roadway between Mercier Bridge and Ville St. Pierre. Over **$200,000.**

Que., Ville St. Pierre (Postal Dist. Montreal)—Province of Quebec, Quebec City, overhead bridge on road between Mercier Bridge and Ville St. Pierre. Over **$150,000.** Dpt. Roads, Quebec City, engrs.

READY FOR BIDS

O., Youngstown—Comrs., Mahoning Co., Court House, plans completed Market St. Bridge reconstruction of superstructure, reinforced floor beams, stringers, steel grid floor, sidewalks and railing, **$250,000;** 3 span continuous steel girder Lake Park Bridge, **$40,000.** Mahoning Co. Engr., Court House.

STREETS AND ROADS

PROPOSED WORK

Ill., Urbana—University of Illinois, Urbana, part of 25 year program, roads and street imprvs., **$65,000;** sidewalks, **$12,000;** landscaping, **$64,000.** Financing not provided.

Mo., Clayton (St. Louis, 5, P. O.)—City, A. H. Kerth, mayor, City Hall, 10 Bemiston St., voted bonds, opening, imprvs. streets, avenues, alleys and other highways, side walks, **$150,000.**

Mo., Richmond Heights (St. Louis, 17, P.O.)—B. W. LaTourette, mayor, bond election May 8, opening, widening and building streets, **$90,000.**

400,000
Gallons of Water Daily
For Park College and City

For more than forty years Park College struggled to serve itself and the City of Parkville, Missouri with water. The water system was inadequate and inefficient to operate. For many years it imposed a heavy financial loss on the college. Furthermore, seldom was an ample supply of water available. Frequently it was necessary to haul water from another city ten miles away.

And then in 1941 the situation became even more critical. Both resident and college use had to be cut to the absolute minimum. By vote, the citizens approved an ordinance granting Layne-Western Company a franchise for taking over and operating the water system. Two new Layne Well Units consisting of Layne Gravel Wells and vertical turbine pumps, capable of producing 400,000 gallons of water daily, were immediately installed. A modern iron removal and water treating plant was rushed to completion.

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LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

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"I'm your Dodge service mechanic. It's *my* job to keep Dodge trucks *on the job*—'hi-balling' war equipment—hauling coal, milk, petroleum and other essentials!

"It's *my* job, too, to keep Dodge and Plymouth passenger cars *on the job* . . . carrying millions of essential war workers to *their* jobs.

"I'm busy, sure. But if YOU need car or truck service to help do *your* war job better . . . I'll take care of you somehow.

"Get in touch with my boss—your Dodge dealer! He has a stock of factory-engineered parts, and a crew of mechanics like me who really are anxious to help you!"

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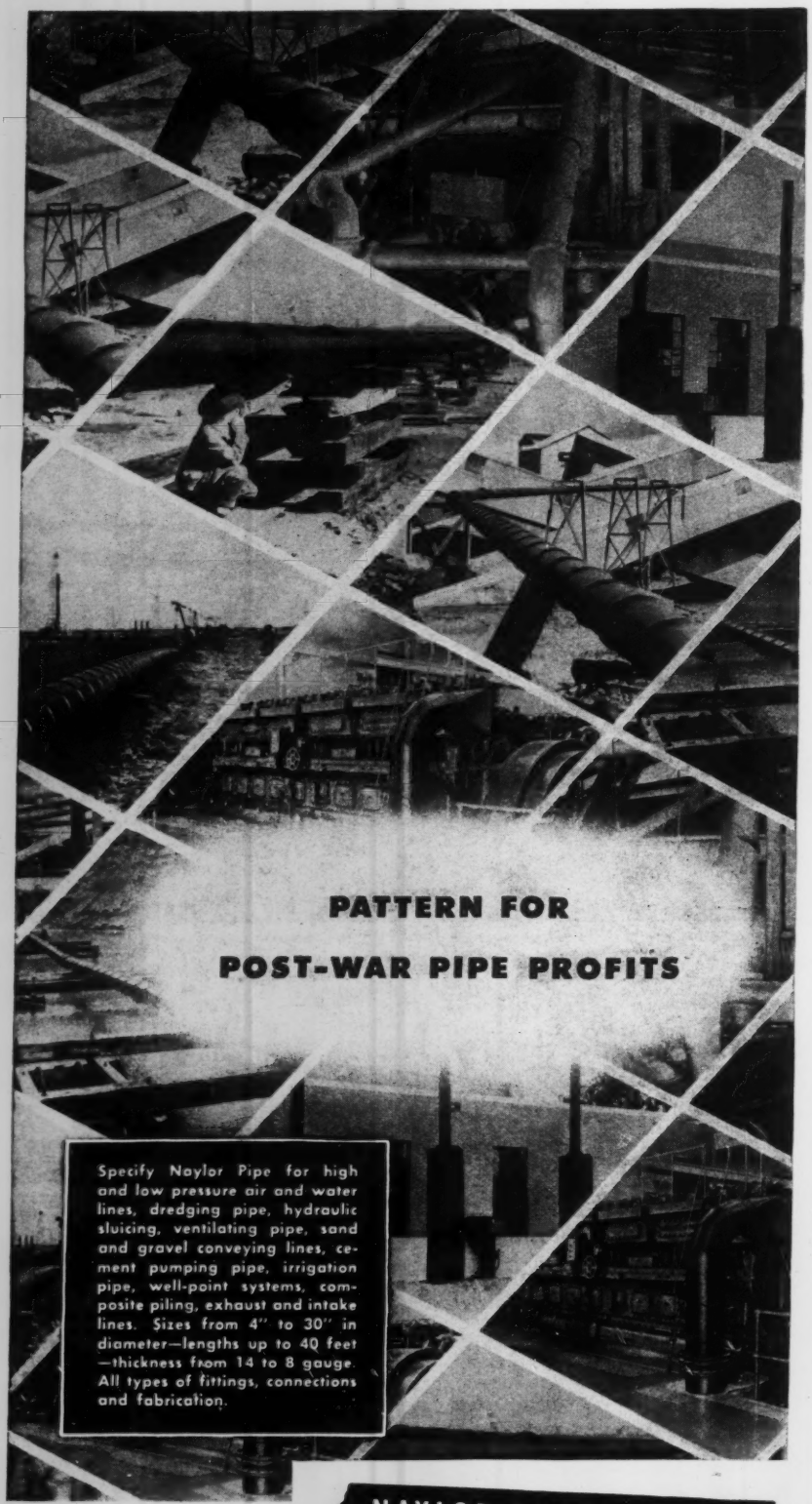
FIT THE JOB ... LAST LONGER

TUNE IN MAJOR BOWES, CBS, THURSDAY, 9 P. M., E. W. T.

AMERICA'S AUTOMOTIVE SERVICE MECHANICS ARE HELPING MIGHTILY TO WIN THE WAR!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POSTWAR PROJECTS (Cont'd.)

PLANS UNDER WAY

Calif., Lodi—City, City Hall, ... ing Pine St., **$148,000**; Sacramento St., **$78,000**; School St., **$50,000**. C. ... City Hall, city engr.

Calif., San Mateo—City, City Hall, ... feated bonds grading, etc. Alameda ... Pulgas, **$250,000**. W. D. Soule, ... city engr. CD 3/19.

Idaho, Boise—City, E. L. ... City Hall, widening streets in business ... trict, **$100,000**; arterial highway ... **$200,000**. Financing not provided. ... Birney, City Hall, city engr.

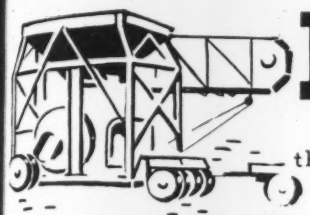
★**Ill., Chicago**—City, Dpt. Streets & ... tricity, City Hall, preliminary ... der way paving primary streets ... old and obsolete pavement with ... width on major streets, **$27,306,000**; ... 000 available; city-wide ... vaulted sidewalks **$4,800,000**, round ... build larger radius curbs, adjust ... and poles **$4,650,000**, construct ... ondary streets, replace broken and ... curbs with new concrete ones ... paving secondary streets, repaving ... **$13,000,000**. Financing not provided ... going projects. J. L. Markey, ... engr. Bureau Streets.

Ill., Springfield—Sangamon Co. ... field, plans 50% completed State ... 3F, **$148,000**. Financing available ... 316 N. Klein St., co. engr. and supt. ...

★**Ill., Springfield**—Sangamon Co. ... field, **$1,900,000** bond election ... highway improvs. R. Tilley, ... road supt. and engr. CD 9/20—ENR ...

★**Massachusetts**—State Dpt. P. ... Nashua St., Boston, plans completed ... structing 3.9 mi. new route from ... Falls to Willimansett St., South ... Chicopee-South Hadley, **$680,000**; ... structing 4.6 mi. State Hy. on Route ... Ashburnham line to Route 31, Ashby, **$740,000** 0.3 mi. State Hy. Route 140 from ... ville Line, southerly, Freetown, **$66,000**; State Hy. Route 140 from New Bedford ... to Route 18, Freetown, **$60,000**; ... Huttleston Ave. Route 6, Fairhaven, **$50,000**; 1 mi. State Hy. through Wales Village, Route 19, Wales, **$110,000**; 3.8 mi. State Hy. on Route 119 from New Hampshire Line to Ashby line, Ashburnham, **$210,000**; 2.4 mi. State Hy. on Route 2, Lunenburg-Shirley, **$250,000**; 2.9 mi. Route 20 from 1941 project easterly to Boy's Club, Brimfield Bypass, Brimfield, **$1,400,000**; 1.8 mi. State Hy. on Route 193, Webster, **$110,000**; 1.1 mi. State Hy. on Route 122 from Trench Ridge to Rhode Island line, Blackstone, **$50,000**; 2.4 mi. State Hy. on Route 8, from Briggs to Vermont line, Clarksburg, **$210,000**; 1 mi. State Hy. on Route 116, Chicopee St., from Chicopee River to Meadow St., Chicopee, **$170,000**; 1.5 mi. State Hy. on Route 116, Sugar Loaf St., Deerfield, **$180,000**; 1 mi. State Hy. on Route 7 from Great Barrington line northerly, Stockbridge, **$80,000**; 0.5 mi. State Hy. on Route 7 from Housatonic River Bridge to Route 23, Great Barrington, **$90,000**; 1.2 mi. State Hy. on Route 116, Adams, **$65,000**; relocation 3.4 mi. Route 202 to avoid Birch Hill Flood Reservoir, north of Baldwinsville Templeton-Winchendon, **$250,000**; 1.3 mi. Route 202, to avoid Birch Hill Reservoir, south of Baldwinsville, Templeton, **$270,000**; relocation of Ayer-Shirley road avoiding 2 grade crossings, Shirley, **$130,000**; completing 2.5 mi. new route from Millers Falls to Route 116, Amherst, Leverett-Amherst, **$360,000**; 3.4 mi. Fitchburg Bypass section of Route 2 relocation, Fitchburg-Westminster, **$710,000**. Land rights not cleared, legal obstacles to be overcome and financing not provided. CD 3/4/43, 7/10/44—ENR 3/11/43, 7/27/44.

Missouri—State Hy. Dpt., Jefferson City, plans 90% completed graded earth and surfacing 2.026 mi. Route D, from Jackson Co. south to Route H, **$54,600**; 4.133 mi. Route D, from Route H, south to Joudon, **$29,300**; both Cass Co.; 6.75 mi. Route A, from Route D east to present construction, **$63,700**; 7.272 mi. Route H, from Bes Worth north, **$39,900**; 3.676 mi. Route E, from present construction west of Carrollton west to Route D, **$71,300**, all foregoing Carroll Co.; 16.1 mi. Route T, from Route C, north and west to Henry Co.-Benton Co., **$56,700**; 3.032 mi. Route D, from Route 71 east towards Missouri City, Clay Co., **$34,000**; 12.894 mi. Route D, from Joudon south through west lines, Cass Co., Route D, **$96,300**; 6.2 mi. Route S, from Rt. F east to Rt. C, **$65,200**; 4.5 mi. Route C, from Route T north to Route W, **$30,500**, both Clay Co.; 1.69 mi. Route K, from Germantown north to present construction, Henry Co., **$36,600**; 9.424 mi. Route D, from east of Route 6 east towards Edwards, Benton Co., **$66,700**; 4.852 mi. Route W, from Route 56 north to Burkville, **$54,300**; 2.845 mi. Route C, from Hagens Grove west to Route C, **$37,000**; 3.952 mi. Route C, from Route M, south to Hagans Grove, **$28,000**, all foregoing Shelby Co.; 4.677 mi. Route B, from Route C, south towards Route 4, **$40,300**; 1.042 mi. Route H, north Wyaconade River west to Route 5, **$30,000**, both Scotland Co.; 3.5 mi. Route H, from Spalding north, **$28,800**; 3.314 mi. Route V, from Route T west and north, **$30,000**, both Ralls Co.; 2 mi. Route M, from present construction south of Curryville, **$48,000**; 2.722 mi. Route C, from west of Frankford West, **$40,000**; 2.995 mi. Route B, from Route 67 to Frankford east, **$30,000**.



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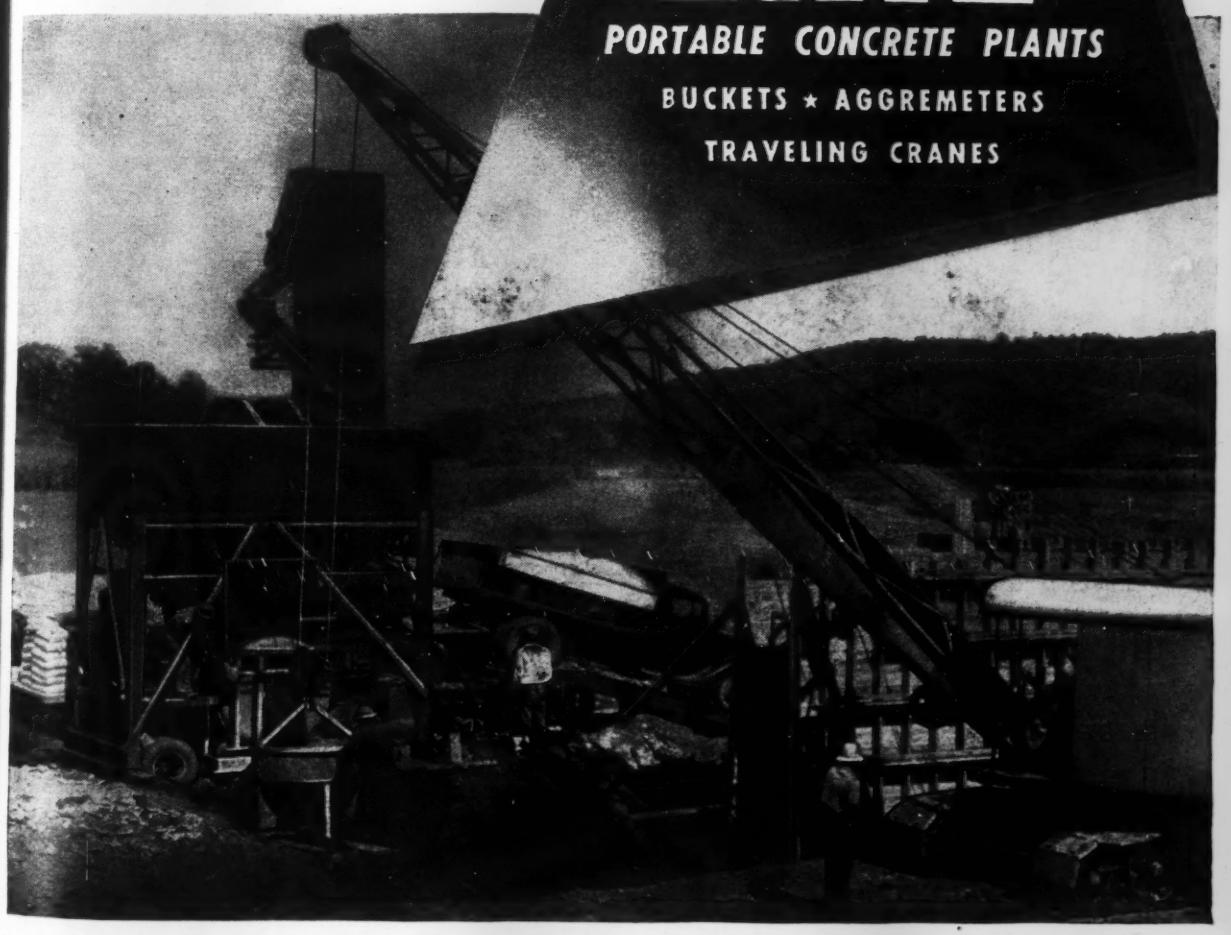

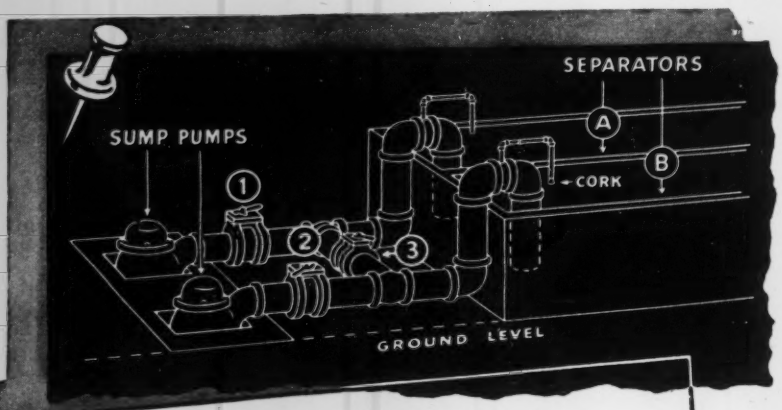

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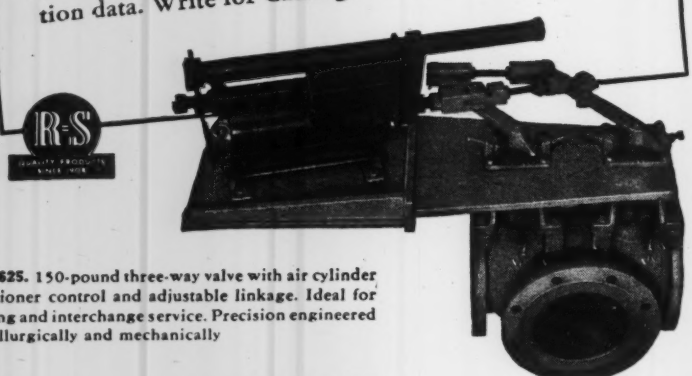
The plant sewer lines drain into the sump where the waste is pumped into the concrete separators through R-S Valves Nos. 1 and 2. Valve 3 in the connecting line provides a means of cleaning either A or B separators, as the ¾-inch syphon breakers can be plugged with corks and the fluid syphoned from the separators to facilitate cleaning operations. The three 16-inch, 15-pound valves have 25-pound American Standard flanged drilling and are hand lever operated.

For fast, easy control and shut-off of volume and pressure, the R-S Butterfly Valve has no equal. One thrust of the hand lever or four to six revolutions of the hand wheel completely open or close the valve vane.

Prompt quotation furnished on receipt of installation data. Write for Catalog No. 14-B.



No. 625. 150-pound three-way valve with air cylinder positioner control and adjustable linkage. Ideal for mixing and interchange service. Precision engineered metallurgically and mechanically

VALVE DIVISION

R-S PRODUCTS CORPORATION

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R-S Streamlined BUTTERFLY VALVES

POSTWAR PROJECTS (Cont'd.)

all foregoing Pike Co.; 4.963 mi. Route [illegible] from Route 24 at Stoutsville North, $35,000; 2.54 mi. Route J, from Route B at Duncans Bridge west to Randolph Co., $27,000, both Monroe Co.; 5.465 mi. Route A, from Route 56 north and west, $70,800; 7.432 mi. Route Z, from Route C south to Route 36, $63,000; 4.254 mi. Route C, from Route K east through Warren, $25,000, all foregoing Marion Co.; mi. Route D, from Route 47 at Le[illegible] north west toward Route E, $27,600; [illegible] Route C, from Ethyln east to Route 61, at Old Monroe, $42,000; 5.995 mi. Route C, from Route 61, Moscow Mills, east to Ethyln, $33,000, all foregoing Lincoln Co.; 3 mi. Route [illegible] from Route 6 at Lewistown, south toward Route B, $34,400; 6.462 mi. Route [illegible] from west of Euring, west to Route D, $47,300; 2.724 mi. Route B, from Route 6 at Euring west, $31,400, all foregoing Lewis Co.; [illegible] mi. Route A, from Lewis Co. [illegible] $26,000; 2.935 mi. Route K, from Route [illegible] north, $25,000; 3.25 mi. Route D, from Wyaconda River west, $25,200; 0.314 mi. Route D, from Wyaconda River east and west, $30,000, all foregoing Clark Co.; 2.927 mi. Route T, from Route East to Route F, $25,000; 3.063 mi. Route J, from Route F east to Route 54 and 19, $30,000; 7.384 mi. Route K, from Route A east to Route W, $81,500, all foregoing Audrain Co.; 3 mi. Route C, from Route 5 to Milan southeast, $28,000; 2.973 mi. Route C, from Route 5 at Milan Southeast, $30,000; 5.079 mi. Route E, from Route B (139), at Harris east and south, $61,000, all foregoing Sullivan Co.; 3.5 mi. Route N, from Route 4 at Downing north, $30,000; 5.677 mi. Route E, from east of Queen City east to Route A, $53,000, both Schuyler Co.; 1.66 mi. Route AA, from Memberly south, $28,000; 9.148 mi. Route Z, from west of Cairo west to Route E, $98,000, both Randolph Co.; 7.157 mi. Route P, from Howland east and north to Iowa line, Putnam Co., $57,000; 5.5 mi. Route K, from Route 6 at Mercer west, Mercer Co., $60,000. C. W. Brown, Jefferson City, ch. engr.

Nev., Sparks—City, City Hall, plans under way paving approx. 170,000 sq. ft. streets, $125,138. G. Schilling, City Hall, city engr.

New Hampshire—State Hy. Dpt., Concord, plans completed road mix on gravel surfacing 1.706 mi. Cheshire Co., $127,000; gravel on 9 in. gravel surfacing, 3.569 mi. Daniel Webster Hy., Coos Co., $161,000. Land rights not cleared. J. O. Martin, Concord, const. engr. CD 8/11—ENR 9/7.

O., Celina—Mercer Co., Celina, plans 30[illegible] completed road widening, $50,000. Financing not provided. Z. M. Flaler, Celina, co. engr.

Ore., McMinnville—City, City Hall, paving 115 blocks city streets, $150,000. Financing not provided. I. Courtemanche, City Hall, city engr.

★**Tex., Galveston**—City, City Hall, plans under way street and highway improvs. inside city limits, $1,000,000 bond election May 8. J. J. Rady, Insurance Bldg., Fort Worth, consult. engrs. CD 11/30—ENR 12/14.

★**Tex., Texas City**—Town, E. A. Johnson, mayor, City Hall, street paving, improvs. Over $1,000,000. Financing not provided. Hare & Hare, 114 W. 10 St., Kansas City, Mo., consult. engrs.

Wash., Bremerton—City, City Hall, plans 50% completed widening 6 St., $200,000; plans 60% completed Shore Drive, $50,000; plans 25% completed 5 St., Pacific to Naval Ave., $90,000; plans 10% completed Burwell St., $75,000. Financing not provided. E. S. Severance, City Hall, city engr. CD 9/29—ENR 10/19.

Wash., Bremerton—City, City Hall, widening 1 St. $100,000. Financing not provided. E. S. Severance, City Hall, city engr.

Wash., Hoquiam—City, City Hall, plans 75% completed constructing, reconstructing roads, streets, $220,000. Financing partially provided. W. L. Lovejoy, City Hall, city engr.

READY FOR BIDS

Ill., Springfield—Sangamon Co., Springfield, plans completed State Aid Route 12, $30,000. Financing available. R. Tilley, 316 N. Klein St., Springfield, co. engr and supt. roads.

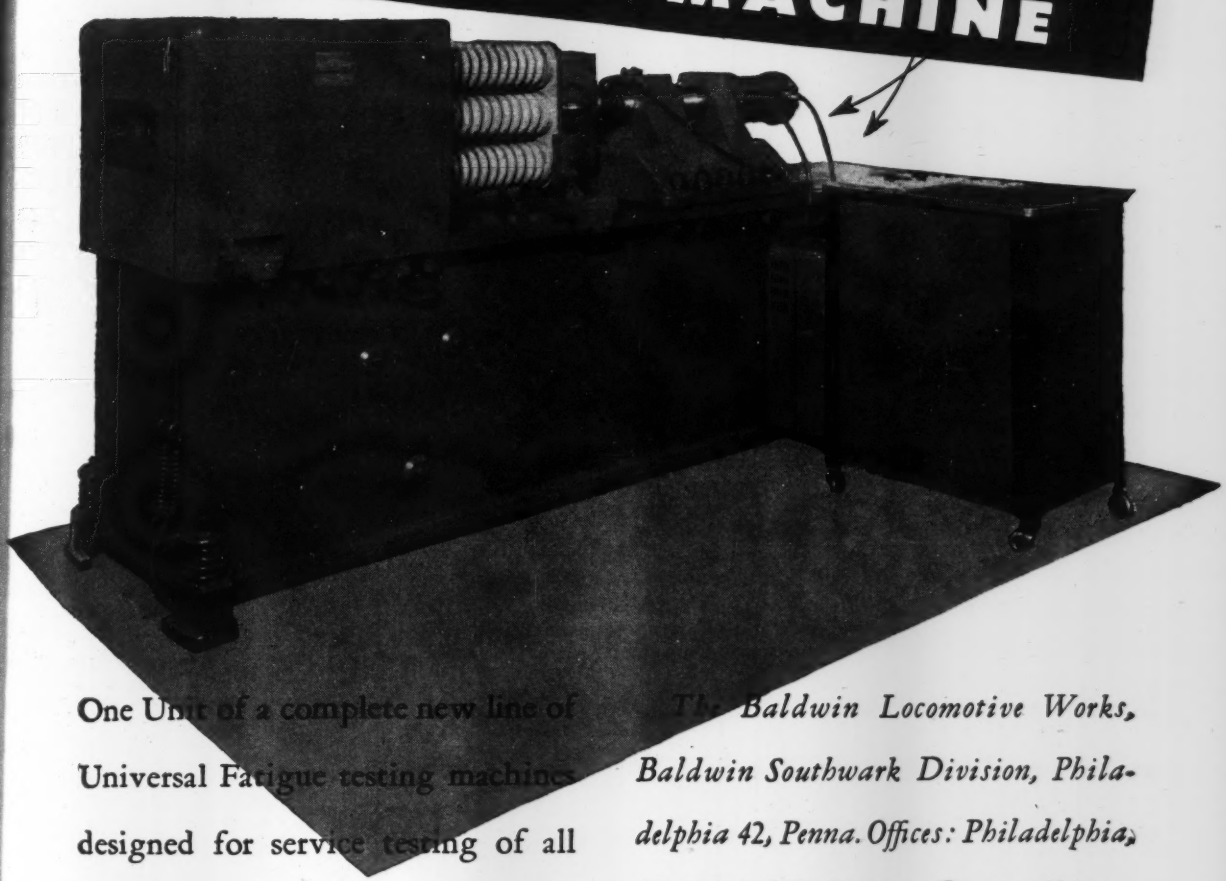
EARTHWORK, WATERWAYS

PROPOSED WORK

★**Illinois**—Dpt. P. Wks. & Bldgs., Div. Waterways, 240 W. Monroe St., Springfield, dredging Little Calumet River, Cook Co., $469,190; beach erosion, Lake Michigan, $62,500; channel imprvs., Boar and Sow Creeks, Pulaski Co., $115,000; Mill Creek, $287,500 and Lower Cache River, $1,115,000, both Alexander and Pulaski Counties; Gimlet Creek, Marshall Co., $319,700; channel imprv., Fox Chain of Lakes, $509,150; Pond Creek, Williamson Co., $185,150; survey, maintenance and repairs Illinois and Michigan Canal, $1,150,875; survey Apple River Base, $5,400; Apple Creek Basin, $8,700; Bon Pas Creek Basin, $5,160; Bear Creek Basin, $6,900; Big Muddy River Basin, $47,200; East Branch Cache River Basin, $14,400; Cahokia Creek Basin, $7,200; Des Plaines River Basin, $24,200; Ohio River Basin, $16,000; Embarrass River Basin,

10,000 lb

UNIVERSAL FATIGUE TESTING MACHINE



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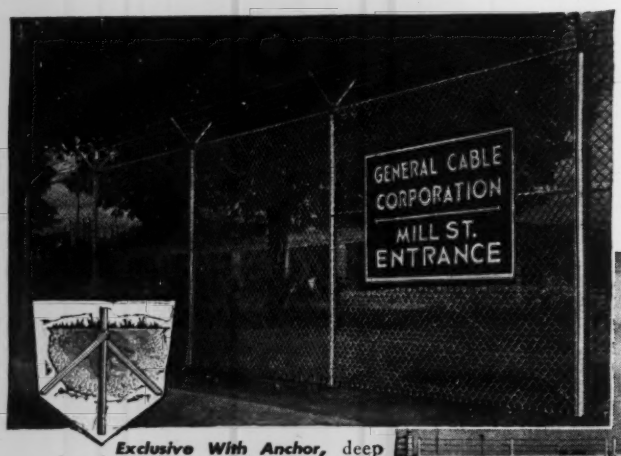

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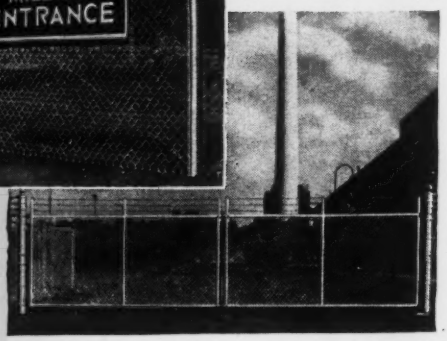

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POSTWAR PROJECTS (Cont'd.)

River Basin, **$24,800**; Kankakee River Basin, **$45,200**; Fox River Basin, **$32,800**; Iroquois River Basin, **$43,100**; Kaskaskia River Basin, **$13,400**; LeMoine River Basin, **$27,200**; Calumet and Chicago Rivers Basin, **$15,600**; Calumet and Mississippi River Basin, **$97,640**; Little Wabash Basin, **$43,600**; Mackinaw River Basin, **$22,000**; Macoupin Creek Basin, **$19,400**; Marys River Basin, **$3,920**; Mazon River Basin, **$10,960**; McGees Creek Basin, **$8,740**; Sangamon River Basin, **$6,140**; Rock River Basin, **$104,000**; Saline River Basin, **$24,600**; Sangamon River Basin, **$84,200**; Spoon River Basin, **$35,000**; Illinois River Basin (partial), **$108,000**; Vermillion River (Illinois Basin), **$26,200**; Vermillion River (Wabash Basin), **$28,200**; Wabash River Basin (partial), **$48,400**. Financing not provided.

★ **Ill., Joliet**—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, imprvs. for flood control, Hickory Creek. **$1,323,750.** Financing not provided.

Mo., Richmond Heights (St. Louis, P. O.)—B. W. LaTourette, mayor, bond election May 8, altering channels of watercourses and building, repairing bridges and culverts, and right-of-way, **$75,000.**

★ **Tex., Beaumont**—City of Beaumont, F. Stone, mayor, City Hall, and Jefferson Co., c/o Judge, Beaumont, drainage sys., city and county areas, **$1,000,000** or more. Financing not provided.

Alta., Redcliff—Canada Land & Irrigation Ltd., Carseland irrigation scheme developing 125,000 acre land. Over **$100,000.**

Alta., Taber—Provincial Govt., Edmonton, 200,000 acres irrigation works. Over **$100,000.**

PLANS UNDER WAY

★ **California**—Bureau Reclamation, Custom House, Denver, Colo., plans under way canals, pumps, and drain Colorado River All-American Canal, **$31,817,000**; concrete dams, canals, pumps, power plants and transmission lines, Central Valley Project (Delta Cross Channel, Keswick, Shasta Dam) Sacramento River, **$113,367,000**; canals and pumping plants, Central Valley (Friant Kern Delta, Mendota) San Joaquin River, **$54,510,000**; earth dam, Hollister Project on Pajaro River, **$3,000,000**; canals and pump plant, Solano Project on Sacramento River, **$10,000,000**; earth dams, aqueduct, pump plants, Colorado River near San Diego, **$22,000,000**; concrete dams, power plants, American River-Folsam Dam Project, **$26,000,000**; earth dams, Santa Barbara Project on Santa Ynez-Cuyama River, **$11,500,000**; concrete dams, canals and drain on Russian River Project on Russian River, **$11,500,000.** CD 4/14/44—ENR 5/4/45.

★ **Illinois**—Dpt. P. Wks. & Bldgs., Div. Waterways, 240 W. Monroe St., Springfield, plans completed 4 dams on Des Plaines River, incl. Irving Pk. Rd., Devon Ave., Dempsey St., Central Rd., **$120,000**; 8 dams Des Plaines River, incl. Hintz, Palestine and Foundry Rds., Hawthorne Lane, Touhy, Lawrence and Armitage Aves., Madison St., **$240,000**; plans under way dams and imprvs. Fox River for Algonquin, McHenry Co., Millhurst, Oswego, Yorkville, Burtons Bridge, Kendall Co. **$365,713.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Anna—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development tributary of Canny Creek, near here. **$148,000.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

★ **Ill., Chicago**—City, Bureau Rivers & Harbors, City Hall, Lake Calumet imprv., establishing initial units of commercial lake-rail-truck-barge harbor, **$6,000,000**; replacement 1,256 ft. pile, timber breakwater north of Navy Pier, **$200,000**; terraced retaining walls at street ends at lake, rein.-con. walls preventing erosion and beautifying lake front, **$200,000**; imprv. N. Branch Chicago River, concrete slab on river bed, remove obstructions, imprv. river bed, **$240,000.** Financing not provided. M. W. Oettershagen, c/o owner, engr.

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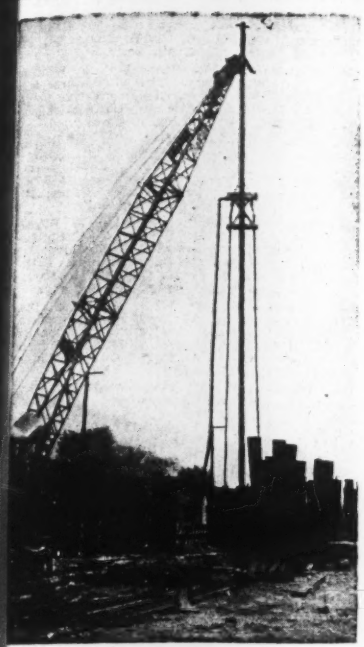

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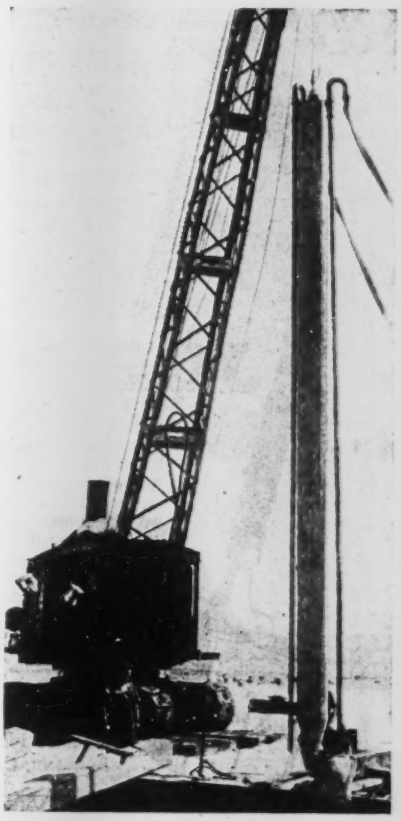

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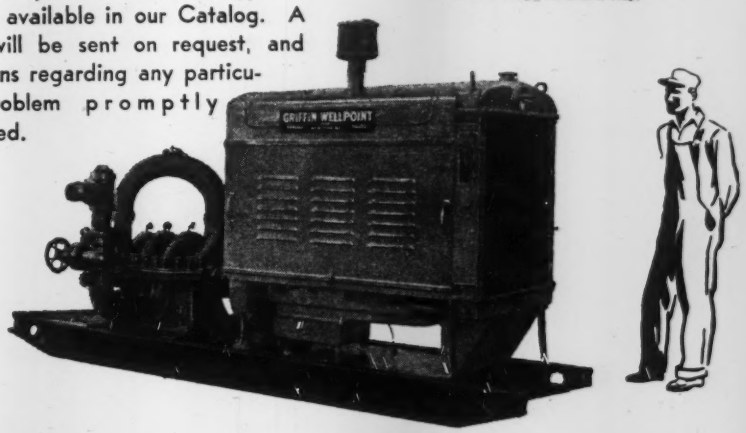

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POSTWAR PROJECTS (Cont'd.)

Ill., Harrisburg—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development, Battle Ford Creek, near here, $136,419. Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Highland Park—State Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, 25 year program, tentative plans completed Harbor of Refuge, Lake Michigan Park, **$488,750.** Financing not provided.

Ill., Jerseyville—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development, tributary of Otter Creek, near here, **$86,219.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Litchfield—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development, West fork of School Creek, near here. **$217,115.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Olney—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, 25% completed lake development, tributary of Little River, near here. **$258,142.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Pana—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development, Beck's Creek, near here, **$121,436.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Streator—Dept. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development, Egg Bag and Eagle Creeks, near here. **$44,704.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Table Grove—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development, Francis Creek, near here. Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Vandalia—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development, Bear Creek, near here. **$110,585.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., West Frankfort—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development, Stevens Creek, near here. **$156,596.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Williamsville—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans 25% completed lake development, Wolf Creek, near here. **$131,954.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

O., Celina—Owner, c/o Z. M. Fialer, engr., Mercer Co., Celina, plans 40% completed open ditches. **$30,000-$40,000.**

★**Oklahoma**—Bureau of Reclamation, Altus, plans 25% completed 18,000 acre irrigation canals from Canton Reservoir on North Canadian River, **$2,000,000;** irrigation canals from Fort Supply Reservoir, **$234,000.** Financing not provided. CD 9/7—ENR 9/21.

★**Tex., Galveston**—City and Galveston Co. Drainage Dist., Galveston, plans under way drainage, **$2,800,000** bond election May 8. Ford, Bacon & Davis, 39 Bway., New York, N. Y., and Texas City, consult. engrs. C.C. Washington, Court House, co. engr. CD 1/10—ENR 1/25.

Tex., Port Arthur—City, City Hall, plans under way open earth ditch, **$15,000.** Financing not provided. J. B. Converse & Co., Port Arthur, consult. engr.

Wash., Hoquiam—City, City Hall, plans 75% completed reclamation and development of tide land areas, **$100,000,** financing partially available; reclamation, development residential areas by filling, etc., **$100,000,** financing not provided. W. L. Lovejoy, City Hall, city engr.

★**Alberta**—Dominion Govt., Ottawa, Ont., irrigating 500,000 acres, Red Deer area, **$7,000,000.** Prairie Farm Rehabilitation Bd., McCallum Hill Bldg., Regina, Sask., engr.

Alta., Medicine Hat—Provincial Govt., Edmonton, 145,000 acres, irrigation scheme. Over **$100,000.** Ministry of Agriculture, Edmonton, engr.

Alta., Milk River—Canadian Pacific Ry. Co., J. E. Armstrong, ch. engr., Windsor Station, Montreal, 2, Que., enlargement of irrigation works.

PUBLIC BUILDINGS

PROPOSED WORK

★**Calif., Long Beach**—Long Beach Bd. Educ., Long Beach, voted **$8,500,000** bonds, schools. CD 2/21—ENR 3/8.

Conn., Danbury—City, Wm. J. Hannon, mayor, City Hall, plans city hall, Main St. Over **$150,000.** Financing not provided.

★**Conn., Milford**—Town, Bd. Selectmen, Town Hall, war memorial, community bldg., swimming pool, **$500,000.** Financing not provided.

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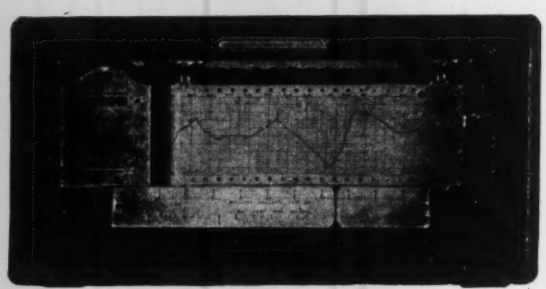

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POSTWAR PROJECTS (Cont'd.)

Conn., West Hartford—Town, Town Mgr. Town Hall, war memorial bldg., recreation unit, Woodlawn St. and New Britain Av. $160,000. Financing not provided.

★**Idaho, Boise**—City, E. W. Little, ch. City Planning Bd., City Hall, municip. auditorium, $600,000; work shop, $40,00. Financing not provided.

★**Ill., Chicago**—City Public Library, Mich. gan and Washington Sts., 1 or 2 sto. bsmnt. branch library, vicinity of 4859 Bur. $228,500; 1 or 2 story, bsmnt. branch libra. vicinity N. Clark St. and W. Greenleaf, p. placing rented quarters at 1731 Greenlea. $182,500; 1 story, bsmnt., branch libra. vicinity of W. Lawrence and N. Central Sts. $152,500; 1 story, bsmnt. branch libra. vicinity of E. 79 St. and Cottage Grove Ave. $157,500; 1 story, bsmnt., branch libra. vicinity of Kedzie and 63 Sts., $157,500; 1 2 story, bsmnt. branch library, vicinity 3600 W. Lawrence St., $177,500; 1 sto. bsmnt. branch library, Sawyer and Altge. Sts. $149,250; addn. to main library, Mich. gan, Washington to Randolph Sts., $807,5. 1 story, bsmnt. branch library, vicinity N. Western and Devon Aves., $142,500; story, bsmnt., branch library, vicinity Fullerton, Belmont, Cicero and N. Narra. gansett Aves., $135,000; 1 story, bsmt. branch library, vicinity of S. Halsted an. W. 79 Sts., $135,000. Financing not provide.

★**Ill., Chicago**—State, Springfield, 25 ye. program, state office bldg., $5,000,00. Land rights not cleared, financing not pro. vided.

★**Ill., Chicago**—University of Illinois, 16. W. Polk St., 25 year program, hospi. addn., $1,721,000; power plant, etc., $1,701,. 000; visual education bldg., $1,100,000, Chicago Campus. Land rights not cleared financing not provided.

Ill., Springfield—Dpt. P. Wks. & Bldgs. 201 W. Monroe St., part of 25 year progra. permanent exhibit bldg., at State Fair, $257. 500. Financing not provided.

★**Ill., Springfield**—Dpt. P. Wks. & Bldgs. Div. Waterways, Springfield, part of 2. year program Office Bldg. Unit 14, $1,184. 500; Office Bldg. Unit 13-A, $412,000; Offic. Bldg. Unit 14-A, $412,000. Land rights no. cleared, financing not provided.

★**Ill., Springfield**—State, Springfield, part of 25 year program, Supreme Court Bldg. Unit 12, $2,060,000. Financing not provided.

Ill., Springfield—State, Springfield, part o. 25 year program, altering Supreme Cour. Bldg., for Illinois State Historical Library. $216,300. Financing not provided.

★**Ill., Urbana**—Dpt. Registration & Educ. Executive Offices, Springfield, 25 year pro. gram applied research laboratory for Geo. logical Survey on University of Illinois Cam. pus, $625,000. Financing not provided.

★**Ill., Urbana**—University of Illinois Springfield, part of 25 year program chemical laboratories, $1,100,000; remodelin. Noyes Laboratory, $549,000; Home Economics Bldg., $844,000; Animal Husbandry labora. tories, $435,000; Dairy husbandry $275,000; Betatrum Laboratory, $1,500,000; veterinary college bldg. $750,000; Mechanical Engineer. ing Bldg., $1,233,000; remodeling bldg. for Aeronautical Engineering Laboratory, $210,. 000; laboratory schools bldg., $791,000; women's gymnasium addn., $175,000; library bldg. addn., $380,000; University Press Bldg. $690,000; hospital addn., $278,000; administration bldg. addn., $445,000; faculty gradu. ates-student center, $530,000; steam, air, electric and gas sys. addns., $338,000; stock pavilion, $75,000; altering 11 bldgs., $1,316,. 870; physical plant service bldg., $690,000; volatile storage plant, $75,000. Financing not provided.

Me., Augusta—State, H. C. Greenleaf, comr. Institutional Service, State House, dormitories at State Hospital. To exceed $250,000. Financing not provided.

Me., Hallowell—State Dpt. Public Bldgs., State House, Augusta, central heating plant at State School for Girls. $85,000. Appro. priation has been voted.

Mass., Stoughton—Town, F. R. Atkinson, mgr., Town Hall, plans town hall. To exceed $150,000. Financing not provided.

Mich., Sturgis—City, City Hall, installing third unit in hydro-electric plant. $175,000.

★**Miss., Clarksdale**—Coahoma Co., Clarksdale, 150-bed hospital serving 3 counties, $750,000. Financing not provided.

Mo., Clayton (St. Louis 5, P. O.)—City, A. H. Kerth, mayor, City Hall, 10 Bemiston St., voted bonds, city hall addn. for use as library, etc., $90,000; municipal auditorium and memorial to Clayton's citizens in armed services, $160,000.

★**Tex., Austin**—State, C. Stevenson, gov., Austin, state courts bldg., $1,000,000; 500-car garage for State Motor Pool, $250,000. Financing not provided.

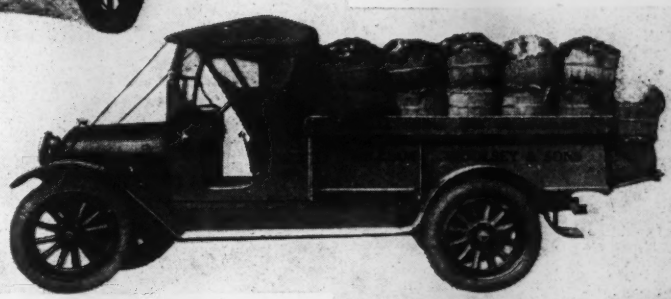
Tex., Beaumont—City, F. Stone, mayor, City Hall, jail and police station. $150,000. Financing not provided.

Tex., Beaumont—City, F. Stone, mayor, City Hall, imprvs., enlargement municipal abattoir, $40,000. Financing not provided.

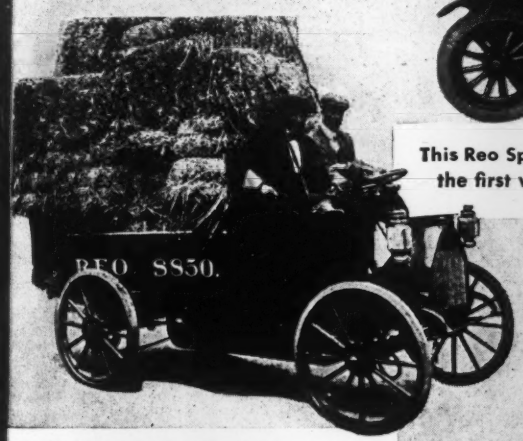
Tex., Beaumont—City, F. Stone, mayor, City Hall, fire station. $250,000 or more. Financing not provided.

On his Lansing visit in 1911, the first President Roosevelt rode in a Reo car.

This Reo was very stylish in 1908—the village smith travels in state.



This Reo Speedwagon was one of the first with pneumatic tires.



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BLAW-KNOX BULLETIN NO. 2035

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There is such a work available now and it is entitled "Blaw-Knox Steel Forms—Is Your Job Large or Small?". For your present or post war work there can be no more valuable piece of literature than Blaw-Knox Bulletin No. 2035. This information is in the form of a triple fold broadside which folds to standard file size but can be opened flat and placed under the glass on your desk top. The folder is offered free to those who wish to obtain a copy of it. It might be well to ask for two copies if you wish to place this under your desk glass.

BLAW-KNOX

Blaw-Knox Division of Blaw-Knox Co., 2001 Farmers Bank Bldg.
PITTSBURGH, PA.

POSTWAR PROJECTS (Cont'd)

Alta., Edmonton—Provincial Govt., A. Hooke, secy., student union bldg., at University of Alberta. **$150,000.**

Ont., Petrolia—Hospital Bd., Town Ha hospital. **$150,000.**

Ont., Welland — Municipality, city ha **$150,000.**

Que., Montreal West—Muni pality, brary, **$150,000.**

PLANS UNDER WAY

Calif., Eureka—Humboldt Co., Eure plans by F. T. Georgeson, Box 55, 2 story h of records bldg. **$300,000.** Financing provided.

★**Calif., Fresno**—Fresno Co., Court Hou plans by F. L. Swartz, 1022 Cambri Ave., library. **$500,000.** Financing provid CD 3/19—ENR 4/5.

★**Calif., Modesto**—City, City Hall, defea bonds administration bldg., $150,0 civic auditorium, **$400,000;** municipal h pital, **$750,000.** F. J. Rossi, City Hall, engr. CD 2/20—ENR 3/8.

Calif., San Mateo—City, City Hall, feated bonds branch library and fire ho police station, **$68,000;** central police sta and jail, **$70,000;** corp. yard bldg., $22,0 site for war memorial bldg., $25,000. W Soule, City Hall, city engr.

Conn., Berlin—Town, A. L. Woodruff, Town Hall, plans by E. Sibley, 83 Wall Norwalk, high school, Patterson Rd. **$150,000.** Financing not provided. CD 12 —ENR 12/28.

★**Conn., Milford**—Town, Bd. Selectme Town Hall, plans by O. Wilkins, Main St., Long Hill, Bridgeport, war memorial, Fowler Memorial Hall, incl. commun bldg., auditorium, swimming pool, recreational facilities, plaques with war veter World Wars 1 and 2, **$500,000.** Financing provided. CD 4/12.

Conn., Stamford—Town, L. S. Stan supt. Schools, 59 Prospect St., plans co pleted by F. L. S. Mayers, 2 W. 47 St., N York, N. Y., brick, steel Junior High Scho Hope St. and Towns Rd. Financing not pr vided. A. Tracy, 322 Main St., consult. engr.

Idaho, Lewiston—School Bd., Lewis plans by Whitehouse & Price, Hutton Bld Spokane, Wash., 1 and 2 story school air circulating equip. and steam heati plant. **$150,000.** Financing not provided.

★**Ill., Chicago**—City Bd. Educ., 228 N. L Salle St., preliminary plans by J. C. Chr tensen, 228 N. LaSalle St., Haven School, 1 S. Wabash St., **$295,000;** 2 story Chapp School, 5145 N. Leavitt St., **$125,000;** J Thorpe School, 8914 Buffalo Ave., $120,0 Franklin School, 226 W. Goethe St., $100,0 Libby School addn., 5300 S. Loomis St., rehabilitation of present bldg., $100,0 Financing not provided.

Ill., Chicago—City Bd. Educ., 228 N. L Salle St., preliminary plans by J. Christense 228 N. LaSalle St., Kelly High Schools addn 4136 S. California Ave., **$100,000;** Ga School addn., 5200 N. Oak Park Ave., $10 000; Otis School addn., 525 N. Armour S **$80,000;** school, 79 St. and Western Ave **$80,000.** Financing not provided.

Ill., Chicago—City Dpt. Educ., 228 N LaSalle St., preliminary plans by J. Christensen, 228 N. LaSalle St., Phil. Sher dan School addn., 9035 Escanaba Ave **$125,000;** Rogers School addn., 7345 N Washtenaw Ave., **$125,000.** Financing provided.

Ill., Chicago—City, Dpt. Health, City Ha plans by P. Gerhardt, Jr., city archt., C Hall, laundry, 3026 S. California Ave, $85,0 Financing not provided.

★**Ill., Chicago**—City, Dpt. P. Wks., Bure Architecture & Bldg. Maintenance, C Hall, plans by P. Gerhardt, Jr., city archt City Hall, 2 story city hall addn., $1,050,0 Financing not provided.

★**Ill., Chicago**—City, Dpt. P. Wks., Bure Architecture & Bldg. Maint., City Ha plans by P. Gerhardt, Jr., city archt., C Hall, Navy Pier bldgs., addns., imprvs., rehibition space and equip., auditorium habilitation. **$1,259,000.** Financing not pr vided.

Ill., Chicago—City, Dpt. P. Wks., Bure Architecture & Bldg. Maint., City Hall, pla by P. Gerhardt, Jr., city archt., City Ha 1 story office garage and storeroom bldg 5 points, **$81,500.** Financing not provided.

★**Ill., Chicago**—City, Dpt. Streets & Elec tricity and City Fire Dpt., City Ha rehabilitation of fire alarm office, 3 ne bldgs., 2,500 new alarm boxes, signal equip rehabilitate police headquarters, 1,500 sign boxes, automatic telephone sys., $3,000,00 garages and shops for city equip., 1 centr garage and shop and 4 outlying garage **$1,630,000;** 27 new ward offices and storag facilities, storage space in 11 wards, rehabili tate 3 offices, **$1,040,000;** Wentworth av 39 St. substations replaced, combined load of 2 obsolete substations to be consolidate into 1 district substation, **$200,000;** centra headquarters for divisions of Bureau Elec tricity, **$600,000;** Rice, Lincoln and Mohaw substations combined into 1 district, $200,00 3 asphalt plants, **$294,000;** substation in orde to provide lighting in newly developed sec

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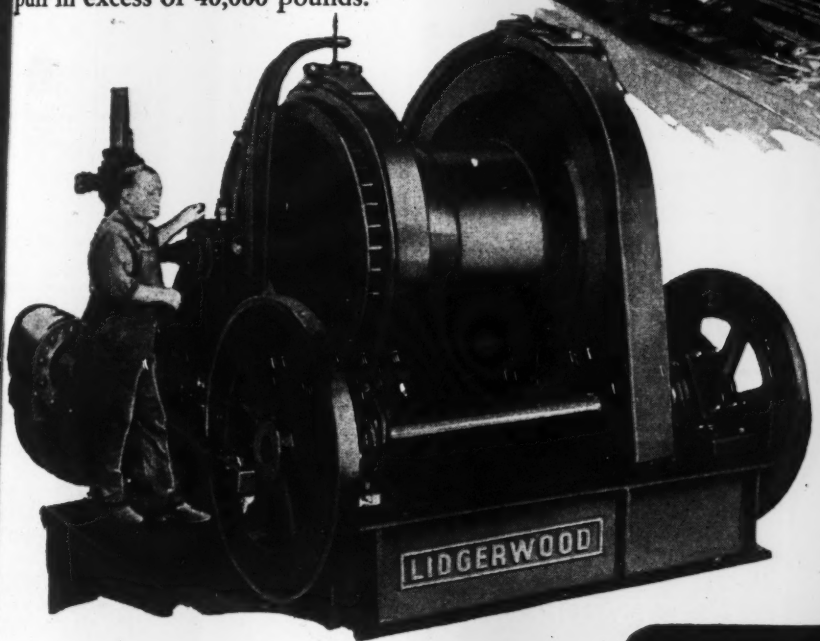

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POSTWAR PROJECTS (Cont'd.)

tions of city, **$150,000.** Financing not provided. C. S. Shaffer, supt. Electricity, and F. M. O'Donnell, ch. electrical engr., both City Hall.

★**Ill., Chicago**—City Fire Dpt., City Hall, plans by P. Gerhardt, Jr., city archt., City Hall, fifteen 2 story, single company fire stations, **$655,325;** five 2 story, brick single company fire stations, **$211,000;** four 4 story, brick double company fire stations, **$276,600;** five 2 story, brick double company fire stations, **$307,500;** 3 story, multiple fire station, 209 N. Dearborn St., **$245,000;** 1 story fire drill school and 7 story drill tower, 19 and Clark Sts., **$340,000.** Financing not provided.

★**Ill., Chicago**—City Police Dpt., City Hall, plans by P. Gerhardt, Jr., city archt., City Hall, 10 story municipal archives bldg. and police dpt. garage, Illinois and Dearborn Sts., **$665,000;** three 2 story district police stations, **$591,305;** 2 story Central Police and Court Bldg. addn., 1121 S. State St., **$400,000;** six 1 story district police stations, **$369,725.** Financing not provided.

Ill., Chicago—University of Illinois, 1853 W. Polk St., plans by E. Steuffer, Dpt. Archt. & Engr., Urbana, 1st unit, power plant on Chicago Campus, **$400,000.**

★**Ill., Chicago**—University of Illinois, 5756 S. Ellis St., plans by E. Stouffer, Dpt. Architecture & Eng., University of Illinois, Urbana, hospital addn., **$2,000,000;** atmospheric research bldg., **$250,000;** utilities distr. sys., **$250,000,** on Chicago Campus. Land rights not cleared, financing not provided. CD 2/4—ENR 3/8.

Ill., Joliet—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans completed combination garage, shop and office bldg., for Bureau of Bridges, **$27,000;** shop, garage and office bldg. combination, Bureau of Maintenance, **$65,100.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

★**Ill., Urbana**—University of Illinois, Springfield, plans completed by E. Stouffer, Dpt. Architecture & Engr., Urbana, band bldg., **$220,000;** library bldg. addn., **$315,000;** plans 20% completed men's and women's residence halls, **$1,500,000;** health and physical education bldg., **$2,000,000;** power plant addn., **$650,000;** fine arts bldg., **$740,000;** Betratron Laboratory for physics research, **$200,000;** veterinary college bldg., **$750,000;** modernizing 11 bldgs., **$500,000;** addns., replacements steam, air, electric and gas distr. sys., **$764,000;** plans 10% completed health service bldg., **$242,000;** making plans electrical engr. bldg., **$875,000;** preliminary sketches chemical engineering bldg., **$615,000.** Financing not provided. CD 2/14—ENR 3/8.

Mass., Fitchburg—City, Mayor Woollacott, City Hall, plans 50% completed by S. W. Haynes & Assoc., 336 Main St., 3 story, brick, steel nurses school of training, Burbank Home. **$375,000.** Financing not provided.

Mass., Northampton—Commonwealth of Massachusetts, Dpt. Mental Health, 100 Nashua St., Boston, plans 60% completed by S. W. Haynes Assoc., 336 Main St., Fitchburg, state hospital fireproofing, PM-8. **$160,000.** Financing not provided. CD 9/29—ENR 10/19.

Ore., Bend—School Dist. 1, Bend, plans by Stokes & Allyn, Hughes Bldg., Portland, gymnasium bldg. at high school, **$150,000.** Financing provided.

Ore., McMinnville—City, City Hall, plans by T. Burns, Pittock Block, Portland, city hall. **$155,000.** Financing not provided.

Ore., Pendleton—State Bd. Control, Salem, plans by L. D. Howell, Fitzpatrick Bldg., Portland, admission hospital, **$225,000;** nurses home addn., at Eastern Oregon State Hospital. Financing provided.

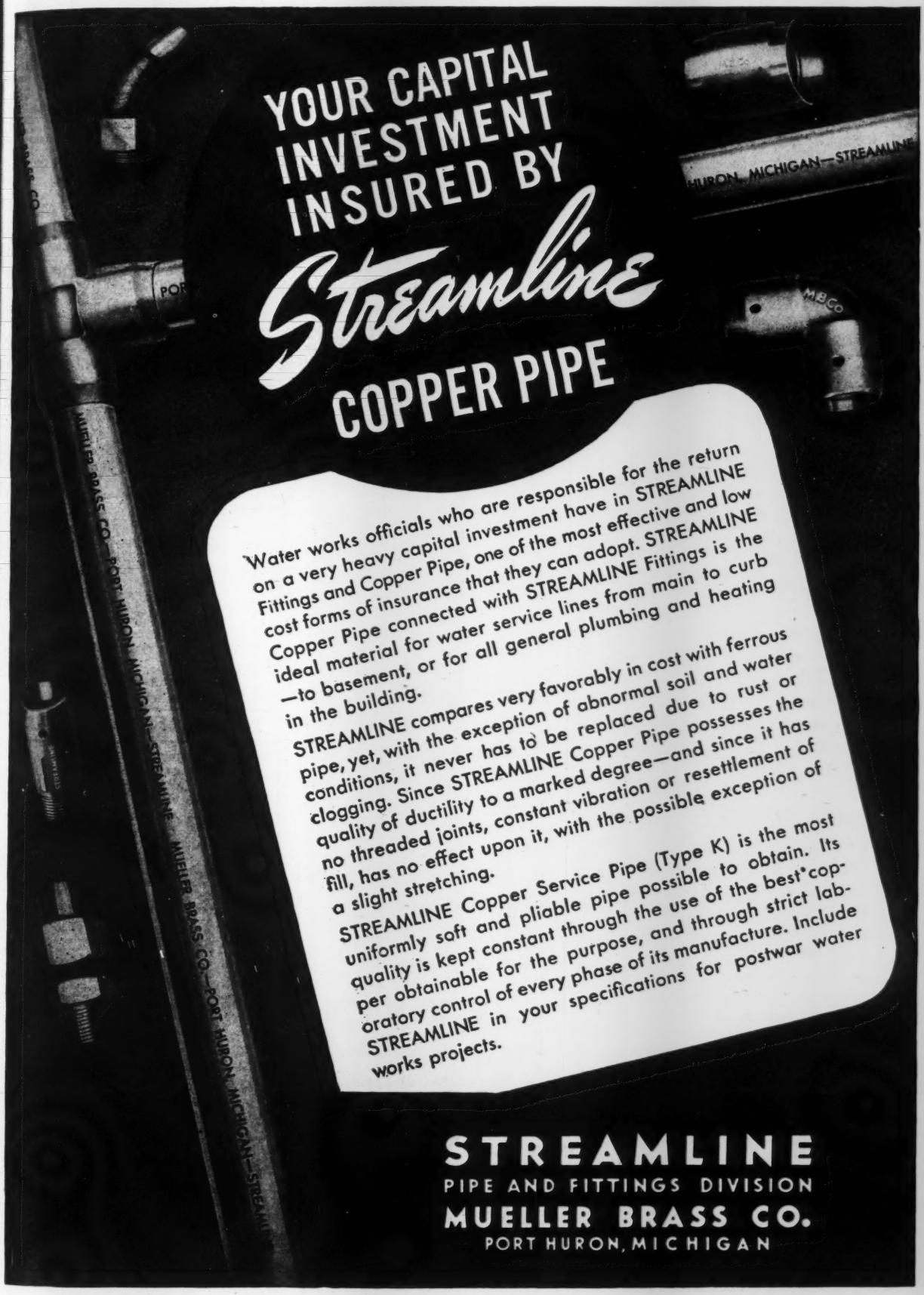
Ore., Salem—State Bd. Control, Salem, plans by Barrett & Logan, 1940 S.W. 4 St., Portland, employees dormitory, **$150,000;** patients cottage, **$93,000,** at Fairview Home, near here. Financing provided. CD 2/1—ENR 2/22.

Ore., Salem—State Bd. Control, Salem, plans by Sutton, Whitney & Aandahl, Lewis Bdlg., Portland, ward bldg., **$275,000;** combined chapel and recreation bldg., **$190,000,** at Oregon State Hospital. Financing provided. CD 2/13—ENR 3/8.

Ore., Woodburn—State Bd. Control, Salem, plans by T. Burns, Pittock Blk., Portland, dormitory, **$40,000;** segregation cottage, **$50,000;** school and shop bldg., **$120,000;** superintendent's cottage, **$7,000,** all at Oregon State Training School. Financing provided. CD 2/8—ENR 2/22.

Tex., Buena Vista—Buena Vista Ind. School Dist., Imperial, plans 50% completed by Haynes & Strange, 415 Myrick Bldg., Lubbock, combination grade and high school. **$210,000** bonds voted. CD 2/23—ENR 3/8.

Tex., Fort Worth—City, I. N. McCrary, mayor, City Hall, plans by P. M. Geren, 806½ Burnet St., W. G. Clarkson & Co., First National Bank Bldg., J. R. Pelich, Trinity Bldg. 5 fire station units. Over **$150,000.** Financing provided.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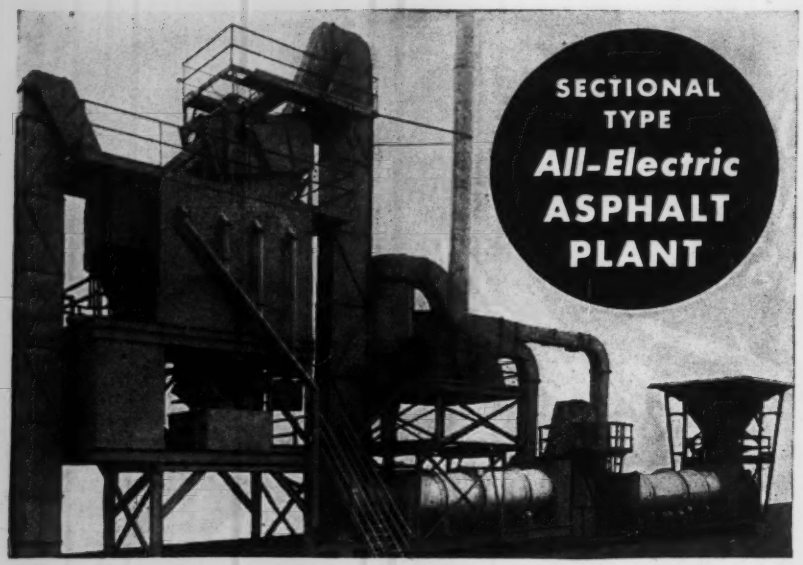

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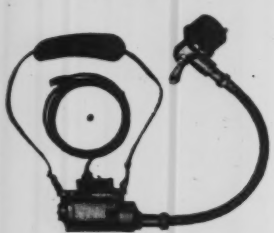

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POSTWAR PROJECTS (Cont'd.)

★**Tex., Texas City**—Texas City Ind. School Dist., Texas City, plans by Jones & Tabor, Union National Bank Bldg., Houston, high school, **$300,000**; grade or elementary school, No. 1, **$150,000**; grade or elementary school bldg., No. 2, **$150,000**; gymnasium and auditorium bldg., **$150,000**. Financing not provided. Hare & Hare, 114 W. 10 St., Kansas City, Mo., consult. engrs. CD 3/22—ENR 4/5.

Tex., Texas City—Town, 111x192 ft., hollow tile, stucco, brick hospital, central heating plant, etc. **$210,000**. Financing not provided. Hare & Hare, 114 W. 10 St., Kansas City, Mo., consult. engrs. CD 5/5—ENR 5/18.

Wash., Moses Lake—School Dist. 161, Moses Lake, plans by Geo. M. Rasque & Son, Washington Trust Bldg., Spokane, 2 story, brick, concrete high school. $150,000. $50,000 bond election Apr. 21.

★**B. C., Vancouver**—Dpt. P. Wks., Ottawa, Ont., Federal Post Office, **$2,000,000**. C. D Sutherland, c/o owner, archt.

Man., Fort Garry (Postal Dist. Winnipeg)—Province of Manitoba, Winnipeg, Faculty of Agricultural Bldg. **$200,000**. Dpt. P. Wks., Winnipeg, engr.

Man., Transcona (Postal Dist., Winnipeg)—Municipality, remodeling cordite plant, **$50,000**. C. W. Makarsky, c/o owner, engr.

Ont., Stratford—Municipality, in cooperation with Province and County, hospital and health facilities, **$300,000**. W. H. Riehl, City Hall, engr. CD 12/28—ENR 1/11.

Ont., Welland—Dominian Govt., Ottawa, exten. post office, adjacent to city hall. **$150,000**. Dpt. P. Wks., Ottawa, archt.

Que., Montreal—Province of Quebec, Quebec City, orthopedic hospital. **$150,000**. Dpt. Health, Quebec City, engr.

★**Que., Val d'Or**—Municipality, hospital, **$150,000**; exten. town hall, remodeling existing structure, remodeling existing and exten. to city prison, **$150,000**; construct civic center, arena, concert hall, etc., **$200,000**; public market and public scales, **$75,000**. E. A. Ouinet, Town Hall, engr.

Sask., Herbert — Municipality, hospital addn. **$150,000**. J. I. Thiessen, Herbert, engr.

READY FOR BIDS

Fla., Gainesville—State, Tallahasee, plans completed administration bldg., $150,000; library addn., **$150,000**; dairy barn, at Experiment Station, **$50,000**, all at University of Florida, Jr. J. J. Tigert, pres. CD 6/29—ENR 7/13.

ADVANCED TO ACTIVE STATUS

Tex., Odessa—Bd. Educ., Odessa, project cancelled brick, stone, concrete Senior High School, concrete fdn. **$475,000**. Work now going ahead. CD 3/2—ENR 3/22.

COMMERCIAL BUILDINGS

PROPOSED WORK

Mass., Beverly—Congregation Sons of Abraham, 41 Bow St., rebuilding synagogue and community bldg. To exceed $150,000. Financing not provided.

Mo., Clayton (St. Louis 5, P.O.)—Thomas Investment Co., J. E. Thomas, pres., 1129 Sanford Ave., Zone 10, apartment fronting 209 ft. on Hanly Rd., and 388 ft. on 716 S. Hanly Rd. **$300,000**. Site purchased.

★**N. Y., Buffalo**—Buffalo General Hospital, 100 High St., 12 story hospital addn., and altering present bldgs. **$4,000,000**.

N. Y., New York—New School for Social Research, 66 W. 12 St., school, 49-57 W. 12 St. Over **$150,000**.

N. C., Salisbury—Yadkin Hotel (Carolina Hotel Co.) C. Peeler, secy., Salisbury, 60 room addn., and renovating, modernizing present 160 room hotel.

★**O., Youngstown** — P. M. Wellman, Youngstown, community business center incl. 2 theaters, and 12 stores on Belmont, Alameda and Catalina Aves. **$700,000**.

Ore., Eugene—American Legion, Eugene Post 3, Eugene, club, 16 Ave. and Willamette St. **$150,000**. Financing not provided.

★**Ore., Portland**—Sandberg-Asbahr Co., 2140 N.E. Union Ave., 150 houses, Mt. Tabor, **$2,000,000**. Financing provided.

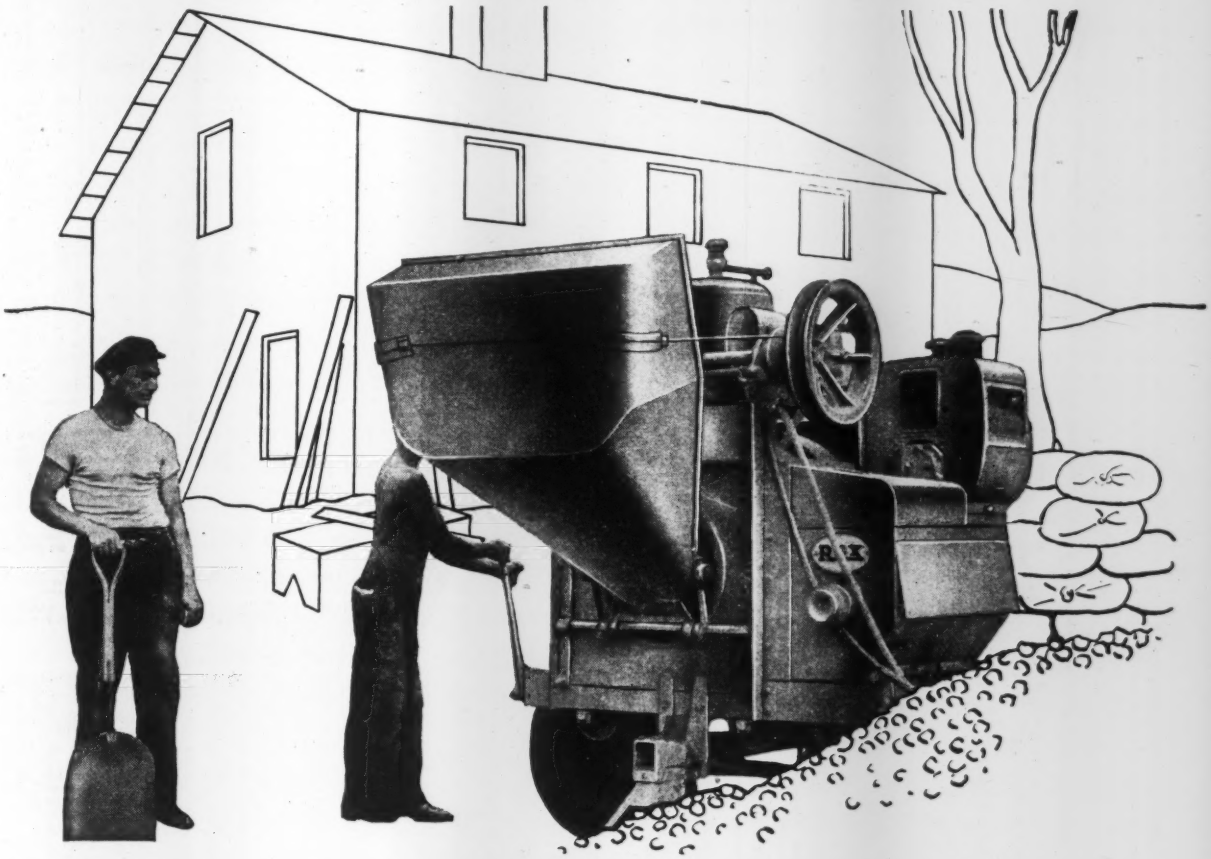
★**Pa., Harrisburg**—Havreen Realty Co., 369 Lexington Ave., New York, N. Y., brick, steel department store. **$1,000,000**.

Pa., Phila.—C. Halyard, c/o B. Ginzburg, Pennsylvania Bldg., purchased 96 acres on Bustleton Pike, 2,580 ft. north of Vertee Rd., Bustleton, for private dwellings.

R. I., Providence—A. Lamarre, 25 Capwell Ave., Pawtucket, 1½ story dwellings, Benefit St. **$150,000**. Financing not provided.

★**Tex., Fort Worth**—Travis Avenue Baptist Church, 3041 Travis Ave., church, **$500,000**. Financing not provided.

★**Tex., Houston**—Main and Dallas Corp., N. Esperson Bldg., retail store, **$2,000,000**. Site purchased.



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POSTWAR PROJECTS (Cont'd.)

Tex., Houston—Jno. D. Roberts and A. Roberts, 224 W. 33 St., community center and tourist courts. **$150,000.** Financing provided.

Tex., Houston—South Main Baptist Church, 4100 Day St., educational bldg. $300,000. Financing not provided.

Wash., Seattle—Seattle Post No. 1, American Legion, 4 and Pike Bldg., Zone 1, altering old Labor Temple, 6 Ave. and University St., for use as meeting hall, gymnasium, swim pool, etc. **$200,000.** Financing not provided.

Wash., Walla Walla—Whitman College, Walla Walla, W. S. Anderson, pres., library, **$150,000**; girls dormitory, **$100,000**; student union bldg., **$60,000.** Financing partially available.

Alta., Calgary—Zeller's Ltd., 1253 McGill College Ave., Montreal, Que., departmental store, **$150,000.** Site purchased.

Man., Winnipeg—Young Mens Hebrew Assn., Hargrave St., Y.M.H.A. bldg. Over **$150,000.**

Ont., Chatham—Zeller's Ltd., 1253 McGill College Ave., Montreal, Que., department store, **$150,000.** Site purchased.

Ont., Toronto—Famous Players Canadian Corp., Ltd., 1200 Royal Bank Bldg., 3 story, bsmnt., brick office bldg., Dundas St. About **$175,000-$200,000.**

Ont., Toronto—**Massey** Hall, Inc., 178 Victoria St., hall, Bloor and Bedford Sts. **$400,000.**

★ **Ont., Toronto**—Toronto Conservatory of Music, 135 College St., bldg. **$2,000,000.** Financing not provided.

Que., St. Agathe de Monto—Laurentian Sanitorium Assn., H. D. Jack, secy., 3664 St. Urbain St., Montreal, living quarters, laundry bldg., auditorium, dwellings for staff. **$350,000.**

PLANS UNDER WAY

Conn., Bridgeport — Salco Amusement Corp., c/o C. H. Abramowitz, archt., 52 Goffe Terrace, New Haven, brick, steel, concrete theater and stores bldg., Pequonnock St. **$200,000.** Financing not provided.

Conn., Hartford—**First** Church of Christ, F. E. Gray, chn. Fund Com., 60 Gold St., plans completed by H. Upjohn, 139 E. 53 St., New York 22, N. Y., brick, steel, stone church, S. Main St. **$190,000.** Financing not provided.

Conn., West Hartford—J. B. Wells, 2668 Albany Ave., plans by N. F. Prentice, 1052 New Britain Ave., Hartford, residential and business community Albany Ave. and North Main St. Over **$150,000.** Financing not provided.

Ga., Atlanta—First Methodist Church, 360 Peachtree St. N.E., Pierce Harris, pastor, plans by G. Bond, Candler Bldg., stone, masonry church addn., steam heating plant. **$300,000.**

Md., Baltimore—Lt. W. G. Barthel, 2604 Garrett Ave., plans by F. Thomas, 726 E. 33 St., 2 story, bsmnt., masonry bldg., containing 10 stores, 12 offices and 6 apartments. **$175,000.**

★ **Mass., Boston**—Emmanuel College, c/o Sister Teresa Patricia, S.N.D, pres., 400 The Fenway, plans by Maginnis & Walsh, 126 Newbury St., brick, concrete, stone science bldg. **$800,000.** Financing not provided.

Mass., Jamaica Plain (mail Boston)—Massachusetts Osteopathic Hospital, 42 Evergreen St., Jamaica Plain (Boston), sketches by Kendall, Taylor & Co., Inc., 221 Columbus Ave., Boston, concrete, brick, stone hospital, maternity wing addn. To exceed **$150,000.**

★ **Okla., Bartlesville**—Phillips Comm. Petroleum Corp., Bartlesville, plans by Neville & Sharp, 1221 Baltimore St., Kansas City, Mo., 9 story, bsmnt. recreational and office bldg., occupying entire block, **$2,850,000.** CD 11/2—ENR 11/9, under Commercial.

Okla., Oklahoma City—First Presbyterian Church, Oklahoma City, plans by Parr & Aderhold, Hales Bldg., suburban church at N.W., 36 and Walker Sts. **$200,000.** Land rights not cleared, financing not provided.

★ **R. I., Warwick**—Rhode Island Home Building Co., 85 Legion Way, Providence, plans nearing completion by O. O. Garwin, 72 Weybosset St., Providence, one hundred twenty-eight 4, 5 and 6 room, brick, timber residences, Roger Williams Terrace. To exceed **$500,000.** Financing not provided.

Tex., Fort Worth—Broadway Presbyterian Church, 400 W. Bway., plans by C. O. Chromaster, Century Bldg., church. **$350,000.** Financing not provided.

★ **Tex., Houston**—First Presbyterian Church, 909 McKinley St., plans 5% completed by H. D. Payne & J. W. Dohnert, 3908 Main St., church, with 1,000 seat capacity auditorium. **$700,000.** Financing not provided. CD 2/24—ENR 3/9.

Tex., Houston — Kincaid Preparatory School, 1300 Richmond St., plans 25% completed by Wm. Ward, 5009 Caroline St., school. **$100,000-$150,000.** Financing provided.

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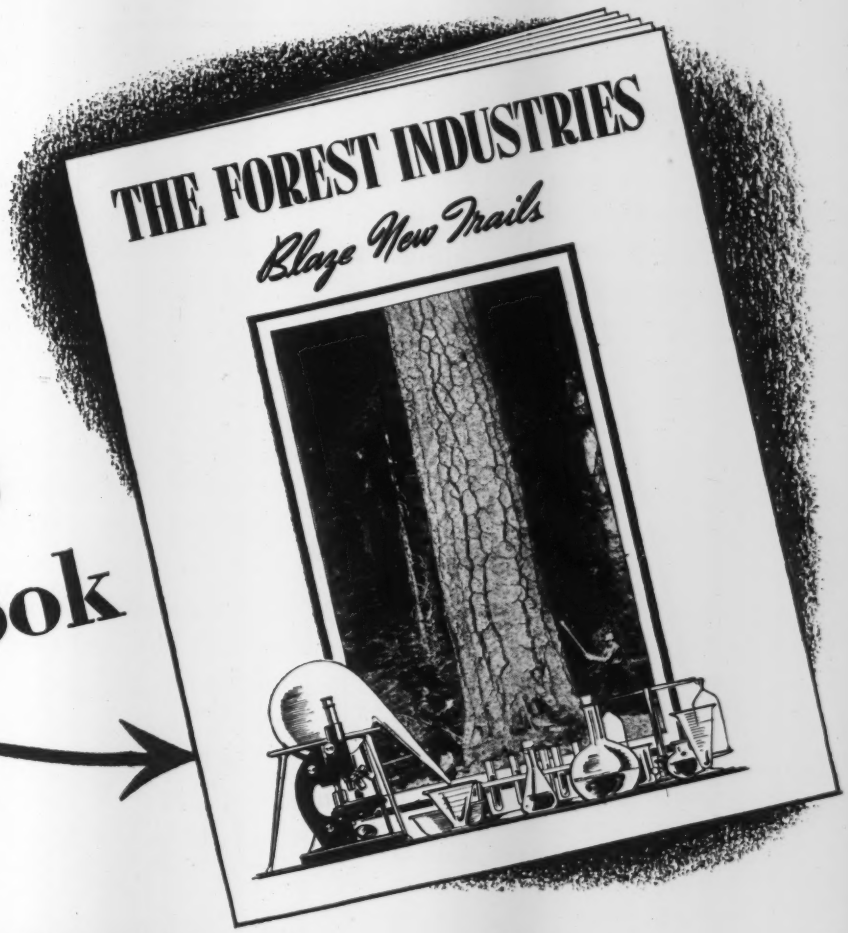

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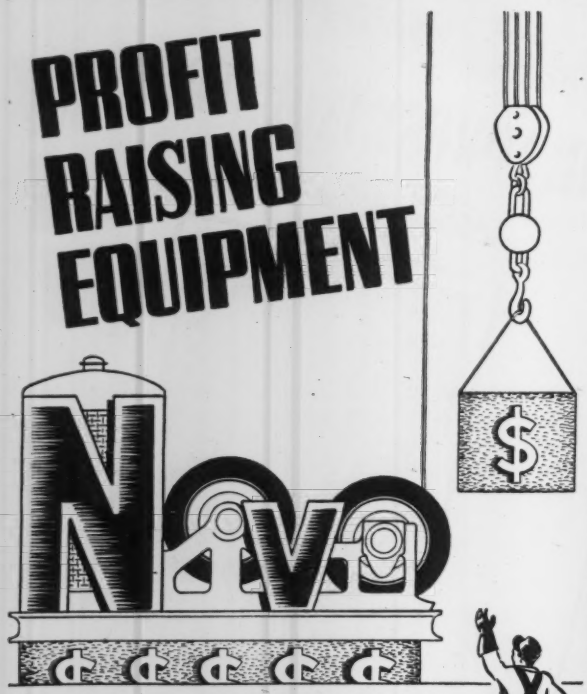

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POSTWAR PROJECTS (Cont'd.)

★**Wash., Seattle**—J. L. Scott, Marion Bldg., Zone 1, plans by W. J. Bain, Smith Tower, 2 and Yesler Sts., Zone 4, 50 colonial type houses in Uplands Dist. **$600,000.**

★**Wis., Janesville**—Mercy Hospital, 566 N. Washington St., plans by E. Brielmaier & Sons Co., 735 N. Water St., Milwaukee, Zone 2, hospital addn. **$400,000-$500,000.** Financing not provided.

Wis., Waukesha—St. Joseph Catholic Congregation, Waukesha, sketches completed by Brust & Brust, 135 W. Wells St., Milwaukee, Zone 3, 2 story, bsmnt. high school, **$350,000.** Financing not provided.

N. S., Chester—Canadian National Rys., H. A. Dixon, ch. engr., 360 McGill St., Montreal, 3, Que., hotel.

N. S., Truro—Canadian National Rys., H. A. Dixon, ch. engr., 360 McGill St., Montreal, Que., hotel. **$150,000.**

READY FOR BIDS

N. Y., New York—Dalu Corp., L. Brecker, pres., 230 W. 52 St., Zone 19, plans completed by J. J. McNamara, 51 E. 42 St., Zone 17, remodeling Gay Blades Skating Rink Bldg., 239 W. 52 St., providing ballroom, roller skating rink and 28 bowling alleys. **$275,000.**

★**N. Y., New York**—Metropolitan Life Insurance Co., 1 Madison Ave., Zone 10, plans completed by I. Clavan, c/o owner, seven 13 story bldgs., known as Riverton Housing, on site bounded by 135 St., 138 St., Harlem River Drive and Fifth Ave. **$3,400,000.** CD 4/11.

CONTRACTS AWARDED

★**Md., Baltimore**—Clover Constr. Co., 3702 Cold Spring Lane, 100 two story, bsmnt., brick residences, Cold Spring Lane, Buchanan and Ridgewood Aves., separate contracts. **$500,000.**

★**N. J., Hackensack**—F. Inganamort, c/o Alexander Summer Co., 790 Queen Anne Rd., Teaneck, 1 family houses on plot bounded by Passaic St., Central Ave. and The Esplanade. Owner builds. **$1,000,000.**

ADVANCED TO ACTIVE STATUS

★**Tex., Houston** — Memorial Hospital, R. Jolley, dir., 602 Lamar Ave., project cancelled, 5 story, 100x225 ft. rein.-con. nurses home and school, concrete slab fdn., Smith St. between Lamar and McKinney Aves. **$1,000,000.** Work now going ahead. K. Franzheim, 2306 Crawford St., Houston, archt. CD 3/7—ENR 3/22.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ind., New Castle—PLANT—Firestone Industrial Products Co., 28 and Grand Ave., plant expan. **$75,000** or more. 26 acre site purchased.

Louisiana — PLANT — Gulf Refining Co., H. G. Weador, div. mgr., Gulf Bldg., New Orleans, plant, incl. service station, storage tanks, warehouses, garages, machine shops, and office bldgs., on 20 acre tract between Rio Vista and Hyman subdivisions, **$400,000.**

N. Y., Jamestown—PLANT—Jamestown Coca Cola Bottling Co., Inc., D. S. Wilkins, gen. mgr., 1085 S. 2 St., 1 and 2 story, bsmnt., brick, concrete bottling plant, with garage, etc., Fairmont Ave. exten. **$50,000.** Site acquired.

Tex., Dallas—WAREHOUSE, etc.—Viking Supply Co., 2330 Summer St., warehouse, factory. **$100,000.** Financing provided.

★**Tex., Houston**—FACTORY—A. C. Horn Co., 2120 Polk St., brick glass type paint, varnish and lacquer mfg. factory, 19-acre site on Buffalo Bayou. **$500,000.** Site purchased. Financing provided.

★**Tex., San Antonio**—PLANT BLDGS.—Southwestern Bell Telephone Co., P. West, div. mgr., 105 Auditorium Circle, 10 year period construction bldgs. and plant imprvs. **$8,500,000.** Financing available.

Va., Bridgewater—PLANT—Celanese Corp. of America, Cumberland, Md., acquired site for knitting mill and enlargement of company's existing plants.

Wis., Fort Atkinson—PLANT—Fur Foods Cooperative, Inc., Fort Atkinson, horse killing and freezer plant. **$50,000.**

N. B., Hartland—PLANT—Hatfield Industries, Ltd., Hartland, exten., adjoining present dehydration plant, **$50,000.**

Ont., Crumlin (near London)—PLANT—Leaven's Bros., Crumlin, plant mfg. small type of airplanes, **$150,000.**

Ont., Gravenhurst — PLANT — Rubberset Co., Ltd., Gravenhurst, paint and shaving brush mfg. plant. **$40,000.**

Ont., Toronto—PLANT—Canadian Juke Box Co., Ltd., c/o W. B. McPherson, 171 Yonge St., automatic phonograph mfg. plant, etc. **$60,000.**

Ont., Toronto—WAREHOUSE—Dominion Stores, Ltd., 3 Sullivan St., brick, concrete warehouse, 1 Dartnell Ave. About **$45,000.**

Ont., Toronto—PLANT—Standard Bedding Co., c/o H. T. Burrell, C. A., 31 Davies Ave., plant mfg. mattress, bed springs, etc. **$40,000.**

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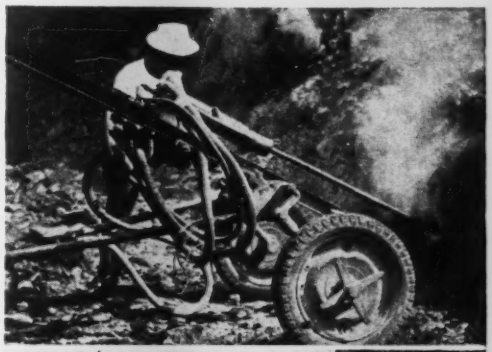

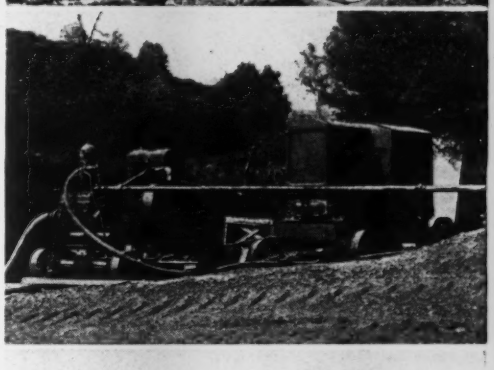

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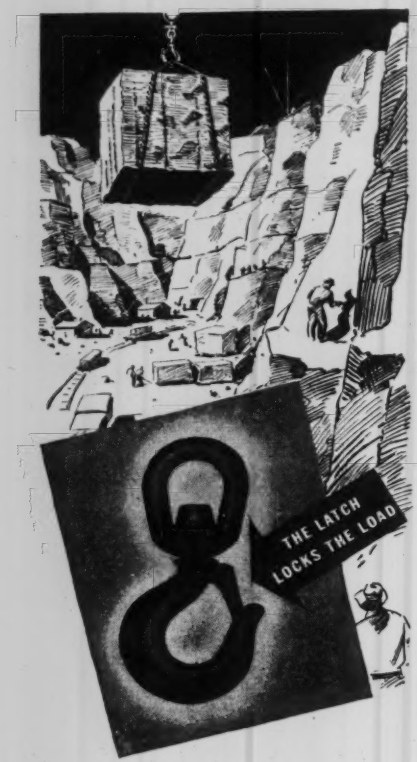

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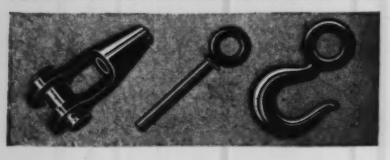

POSTWAR PROJECTS (Cont'd.)

Ont., West Lorne—PLANT—Erie Flooring & Wood Products, Ltd., West Lorne, woodworking plant, **$50,000.**

Que., Montreal—FACTORY—E. Ostegaard Die Sinkers, Inc., 277 W. Craig St., factory. **$40,000.**

Que., Montreal—FACTORY—Sparton Mfg. Co., Ltd., 277 Craig St. W., factory. **$40,000.**

Que., Montreal—PLANT—Victoria Precision Tool Co., Ltd., 277 Craig St. W., plant reconstruction. **$50,000.**

PLANS UNDER WAY

Ariz., Phoenix—PLANT—Arizona Publishing Co., 112 N. Central Ave., plans by Lescher & Mahoney, Title & Trust Bldg., publishing plant, Van Buren, 1, 2 and Polk Sts., for Arizona Republic and the Phoenix Gazette.

Conn., Bridgeport—SERVICE AND SALES—General Fuel Co., 208 Middle St., plans by L. Asheim, 211 State St., 2 story, 50x100 ft., 35x45 ft. auto service and sales bldg., incl. lubritorium, repairing service. **$105,000.** Financing not provided.

N. H., Nashua — WAREHOUSE — Noyes Buick, 270 Main St., plans nearing completion by S. F. Hooper, 199 Washington St., Boston, Mass., rebuilding warehouse. To exceed **$40,000.**

Okla., Oklahoma City—SALES AND DISPLAY ROOM—W. E. Allen, 1117 N. Robinson St., plans 25% completed by L. Bailey, Colcord Bldg., 200x300 ft., automobile sales and display room, 13 and Harvey Sts. **$225,000.** Legal obstacles to be overcome. Financing provided.

★**Okla., Oklahoma City**—PLANT—Classen Co., Terminal Bldg., plans 5% completed plant development, incl. utilities, site preparation and construction of houses. **$1,000,000.** Legal obstacles to be overcome. H. V. Becker, Terminal Bldg., engr.

Tex., Houston—PLANT—C. Selzer Plumbing Supply Co., 1309 Congress Ave., plans under way plant expansion. Over **$40,000.** Site purchased. Financing provided.

★**Ont., London**—PLANT—Tuckett Tobacco Co., Ltd., Queen St. N., Hamilton, plans by Imperial Tobacco of Canada, Ltd., 310 Craig St. E., Montreal, Que., cigarette mfg. plant, First St. **$1,000,000.**

READY FOR BIDS

Fla., Winter Haven—PLANT—Stores & Locker Sys., Inc., Winter Haven, plans completed meat packing plant and cold storage locker sys. **$150,000.** N. L. Hales, Winter Haven, engr.

CONTRACTS AWARDED

Mo., St. Louis—PLANT BLDGS.—B-1 Beverage Co., 4000 Lindell Blvd., Zone 8, steel, concrete, structural glass block office and laboratory bldg. containing 48,000 sq. ft., and warehouse, 65,000 sq. ft. floor space, 4000 Lindell Blvd., to L. O. Stocker Co., Arcade Bldg., 806 Olive St., Zone 1, **$75,000.** E. J. Lawler, 3672 Hickory St., Zone 10, archt.

★**O., Columbus**—PLANT—Fisher Body Co., Inc., Div. General Motors Corp., General Motors Bldg., Detroit, Mich., general contract body mfg. plant, incl. disposal plant, Georgesville Rd. and W. Broad St., to Darin & Armstrong, Inc., 1620 N. James Rd. Est. **$8,000,000–$12,000,000.** Albert Kahn Associated Architects & Engineers, Inc., 345 New Center Bldg., Detroit, Mich., archts., Jennings & Lawrence Co., 12 N. Third St., consult. engrs. CD 11/16—ENR 11/30, under CA.

PROJECTS CANCELLED

★**Tex., McAllen** — PLANT — Coastal Refineries, Inc., Alamo National Bldg., San Antonio, project cancelled, recycling plant. Over **$500,000.** CD 9/1/43—ENR 9/23/43.

UNCLASSIFIED

PROPOSED WORK

Conn., Madison—PARK IMPROVEMENTS—State Park & Forest Comn., State Office Bldg., Hartford, park imprvs., incl. pavilion, walks, etc. **$50,000.** Financing not provided.

Ill., Carbondale—FISH POND—Dpt. Registration & Educ., Executive Offices, Springfield, part of 25 year program, experimental fish pond near here for Natural History Survey. **$82,915.** Financing not provided.

Ill., Danville—FISH POND—Dpt. Registration & Educ., Executive Offices, Springfield, part of 25 year program, experimental fish pond near here, for Natural History Survey, **$124,630.** Financing not provided.

Ill., Rock Island—WHARF—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, wharf facilities in Mississippi River. **$70,437.** Financing not provided.

Minn., Staples—AIRPORT—City, W. C. Galvin, clk., City Hall, municipal airport. **$25,000.**

Mo., Clayton (St. Louis, 5, P. O.)—PARK IMPROVEMENTS—City, A. H. Kerth, mayor, City Hall, 10 North Bemiston St., voted bonds, acquiring and imprv. public parks, **$300,000.**

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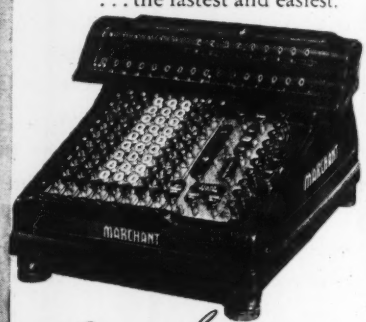

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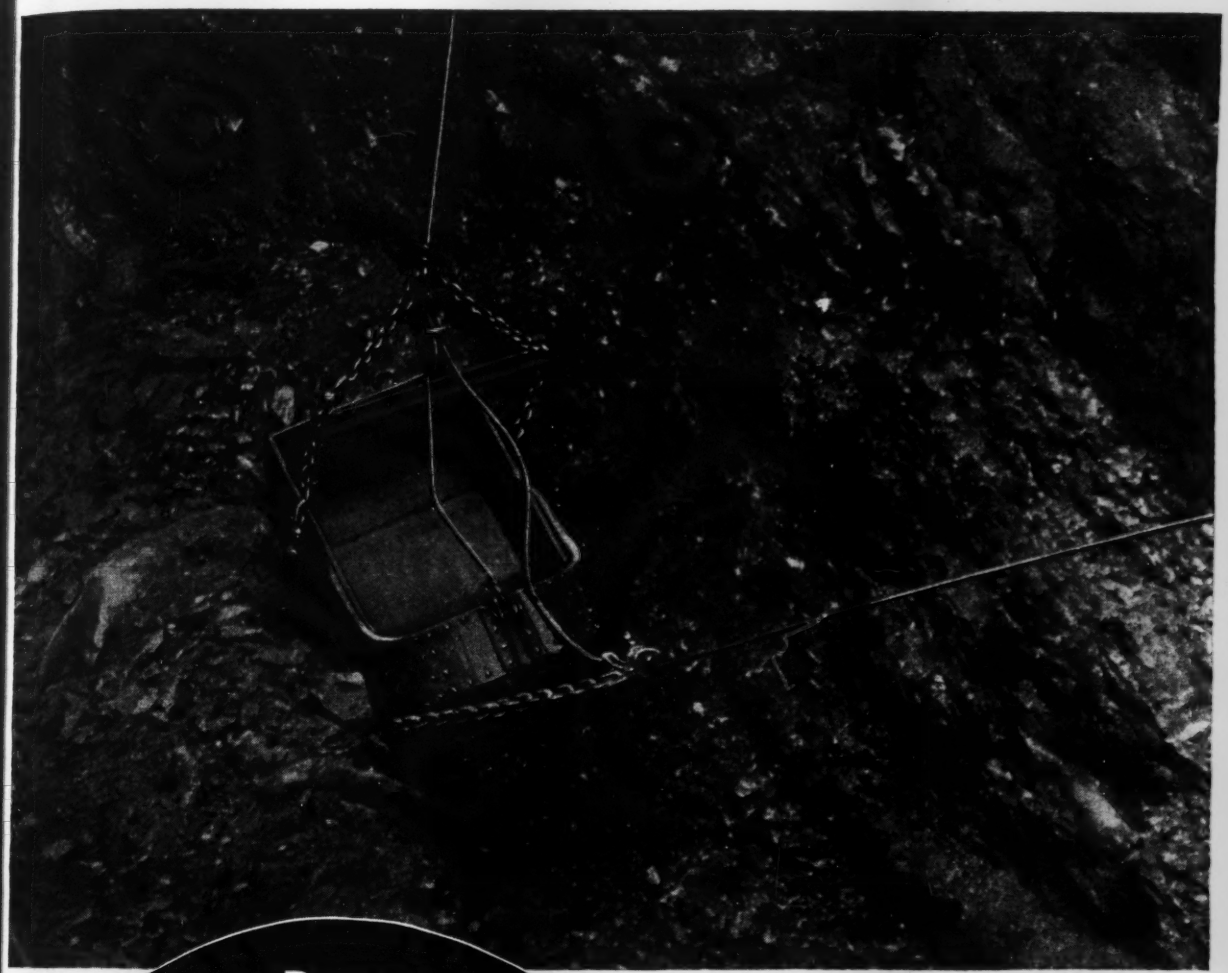

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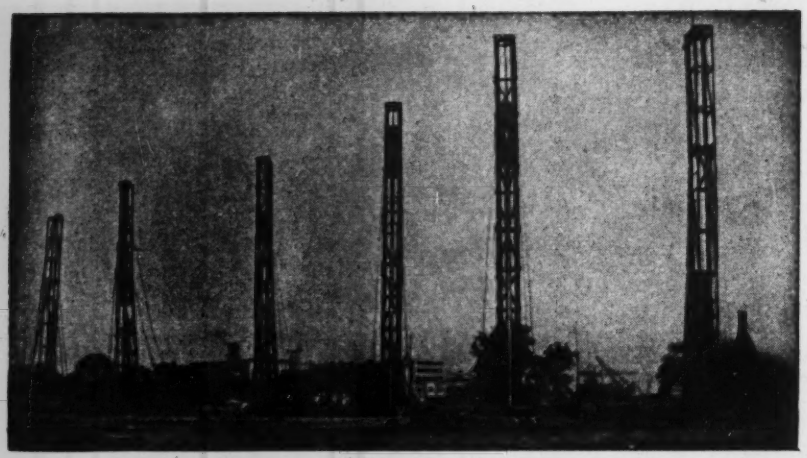

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POSTWAR PROJECTS (Cont'd.)

Mo., Richmond Heights (St. Louis, P. O.)—PARK, etc.—B. W. LaTourette, mayor, bond election May 8, park with swimming pool, other recreational facilities, $400,000.

★ **Oklahoma and Michigan**—GAS PIPE LINE—American Light & Traction Co., Rockleigh, N. J., 816 mi. 26 in. and 260 mi. 22 in. natural gas pipeline from Oklahoma to Michigan through Missouri, Iowa, Illinois, Wisconsin and Michigan, and compressor station, $70,000,000.

Pa., Harrison City—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway.

Pa., Ligonier—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway, $42,000.

Pa., Manchester—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., airport, 1,800-2,700 ft. runway. $30,000.

Pa., New Freedom—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., airport, 1,800-2,700 ft. runway. $30,000.

Pa., Vandergrift—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., airport, 1,800-2,700 ft. runway. $52,500.

Pa., Westfield—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway, $45,000.

Tex., Beaumont—City, F. Stone, mayor, City Hall, plans 10% completed enlargement, remodeling WW sys. Over $100,000. Financing not provided.

Tex., Fort Worth—BATHHOUSE, etc.—City Recreation Dpt., City Hall, bathhouse, beach, pavilion, camp facilities at Lake Worth Recreation Center, $65,000; tennis courts, soft ball fields and bleachers, impr. playgrounds, $40,000; 4 recreation bldgs., $260,000; filtration and chlorination equip. for swimming pools, $50,000. Financing not provided.

★ **Tex., San Antonio**—COMMUNICATIONS SYSTEM EXTENSION — Southwestern Bell Telephone Co., P. West, div. mgr., 105 Auditorium Circle, 10 year period expan. communications sys., lines, etc. $9,000,000. Financing available.

Wash., Rosalia—SWIMMING POOL—City, G. Blackman, mayor, City Hall, 50x100 ft. swimming pool. $25,000. Financing provided.

Alta., Edmonton — POWER DEVELOPMENT — Alberta Power Comn., Edmonton, survey completed power development on the North Saskatchewan River, over $1,000,000.

★ **Alta., Peace River**—POWER DEVELOPMENT—Alberta Power Comn., Edmonton, survey completed power development on the Peace River, over $500,000.

★ **Labrador** — HYDRO-ELECTRIC POWER DEVELOPMENT, etc.—Labrador Mining & Exploration Co., Ltd., 215 St. James St., Montreal, Que., hydro-electric power development, and railroad construction. $3,000,000.

Man., Herb Lake — SHAFT SINKING — Nor Acme Mines, Ltd., 603 Standard Bldg., Saskatoon, shaft sinking and diamond drilling. $80,000.

Northwest Territories—HYDRO-ELECTRIC DEVELOPMENT—Calgary Power Co., Ltd., Calgary, Alta., surveys in progress hydro-electric development on Lockhart River.

Northwest Territories—HYDRO-ELECTRIC DEVELOPMENT—Ontario Hydro Electric Comn., University Ave., Toronto Ont., surveys in progress hydro electric development on Beaulieu River.

N.W.T., Yellowknife—POWER FACILITIES—Calgary Power Co., Ltd., Calgary, exten. power facilities on Yellowknife River. $250,000.

N. W. T., Yellowknife—POWER DEVELOPMENT—Con Mining & Smelting Co., Ltd., Yellowknife, enlarging power development at Bluefish Lake, an addnl. 10 ft. and dam construction at outlet of Duncan Lake about 25 mi. upstream to raise water of lake about 10 ft. Over $300,000.

N. W. T., Yellowknife—SHAFT SINKING etc.—Giant Yellowknife Mines, Ltd., 80 W. Ring St., Toronto, Ont., shaft sinking and diamond drilling. $100,000.

N. S., Inverness—PARK—Provincial Govt., Halifax, exten. Cape Breton National Park, Inverness Co., north of existing park. $100,000.

Ont., Riverside (Postal Dist. Windsor)—PARK—Municipality, memorial town park, gardens with supervised beaches, playgrounds, etc., along some 6 mi. river front. $70,000.

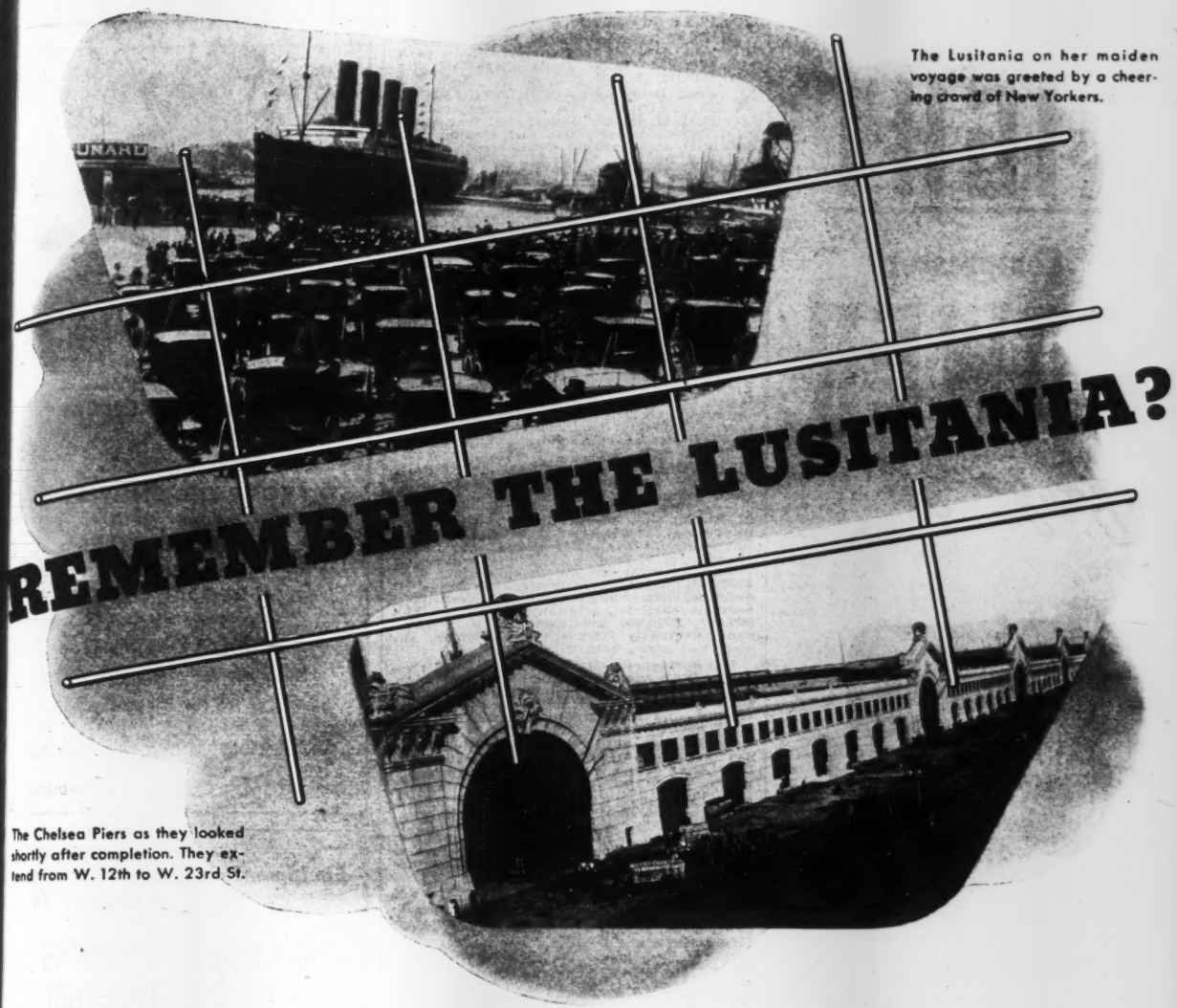
★ **Ont., Toronto**—POWER LINES, etc.—Municipality, placing underground overhead power and telephone lines in downtown areas. $500,000.

Ont., Windsor—RECREATIONAL CENTER—Municipality, development of Peche Island as recreational centre. $100,000.

Que., Quebec City—SEAPLANE BASE—Dominion Govt., Ottawa, Ont., seaplane base, $200,000. Dpt. Transport, Ottawa, Ont., engr.

PLANS UNDER WAY

Calif., Modesto—AIRPORT, etc.—City, City Hall, defeated bonds, airport imprvs., $75,000; imprv. fire protection sys., $40,000. F. J. Rossi, City Hall, city engr. CD 2/21—ENR 3/8.



The Lusitania on her maiden voyage was greeted by a cheering crowd of New Yorkers.

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The Chelsea Piers as they looked shortly after completion. They extend from W. 12th to W. 23rd St.

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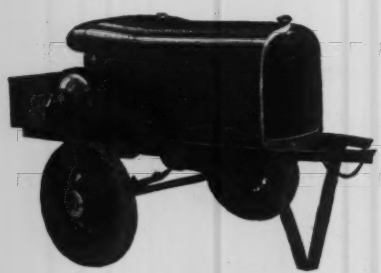

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POSTWAR PROJECTS (Cont'd.)

Calif., San Mateo—PARK SYSTEM—City, City Hall, defeated bonds imprv. public park sys. **$340,000.** W. D. Soule, City Hall, city engr. CD 3/19.

★ **Conn., Bridgeport** — ATHLETIC FIELD and STADIUM—City, J. McLevy, mayor, City Hall, W. Parker Seeley, chn. War Memorial Comn., athletic field and stadium war memorial, incl. parking areas, baseball, softball and football, bandshell, **$500,000.** Financing not provided. H. Lindsay, 211 State St., archt. CD 2/7—ENR 3/22.

Conn., Middletown—STADIUM, etc.—City, Supt. Schools, 251 Court St., plans by G. F. Lamb, 121 Clover St., stadium, rest room, first aid room, lockers, field house, band shell, Woodrow Wilson High School Field, **$25,000.** Financing provided. CD 11/30—ENR 12/14.

Ill., Channahon—WHARVES, etc.—Dpt. P. Wks. & Bldgs., Div. Waterways, 201 W. Monroe St., Springfield, plans completed wharves and custodian's house, **$28,750.** Financing not provided. T. B. Casey, 201 W. Monroe St., Springfield, ch. engr.

Ill., Chicago—DOCKS—City, Bureau of Rivers & Harbors, City Hall, Chicago River Docks at street ends, replacing dock structures, incl. creosoted pile, timber and anchorages, **$125,000.** Financing not provided. M. W. Oettershagen, City Hall, engr. Bureau of Rivers & Harbors.

★ **Ill., Chicago**—STREET LIGHTING, etc. —City Dpt. Streets & Electricity, City Hall, preliminary plans under way addnl. arterial and business type street lighting, **$2,500,000,** $400,000 available; plans under way addnl. residential street lighting **$2,-500,000,** funds available; conduit sys. addns. 50 mi., city wide, new conduit sys., meeting demands for various underground distr. sys., **$500,000,** partially financed; rehabilitation overhead street lighting equip., replacing portions obsolete, deteriorated lighting **$1,-000,000,** $350,000 available. C. S. Shaffer, supt. electricity, and F. M. O'Donnell, ch. electrical engr., both City Hall.

Ill., Springfield—MONUMENT REPAIRS—State Div. Architecture & Engr., Armory Bldg., monument repairs Lincoln Tomb, **$52,500.** C. Herrick Hammond, Div. Architecture and Engr., State Armory Bldg., state archt.

Ill., Urbana—SWIMMING POOLS—University of Illinois, Urbana, plans by E. Stouffer, Dpt. Architecture & Engr., Urbana, altering imprv. swimming pools, **$60,000.**

Ill., Warren—PARK—State Div. Parks & Memorials, Armory Bldg., Springfield, custodian's residence and service area at Apple River Canyon St. Park, near here. **$36,750.** C. Herrick Hammond, Div. Architecture & Engr., Armory Bldg., Springfield, state archt.

Okla., Oklahoma City—FIRE ALARM SIGNAL SYSTEM—City, City Hall, plans 10% completed exten. fire alarm signal sys. **$375,000.** Financing not provided. R. Lee, Jr., City Hall, engr.

R. I., Providence—POWER DISTRIBUTION, etc.—City, Wm. J. Maguire, supt. Public Bldgs., City Hall, making plans exten. power distr. and fire extinguisher sys., at Charles V. Chapin Hospital, **$25,000.**

★ **Tex., Fort Worth**—PARKS—Bd. Park Comrs., M. E. Berney, pres., City Hall, plans under way addnl. bldgs., Forest Park Zoo, **$85,000;** lake and dam in Trinity River for Trinity Park, **$25,000;** exten. Garden Center Bldg., Botanic Garden, **$34,500;** shelter, Willing Place Park, **$25,000;** parkways and drives in various parks, **$250,000;** imprvs. Van Zandt land for park, **$50,000;** shelter, Lincoln Park, **$25,000;** shops, etc., for parks, **$45,000.** Financing not provided. Hare & Hare, 114 W. 10 St., Kansas City, Mo., consult. engrs.

Tex., Fredericksburg — AIRPORT — Gillespie Co., c/o Judge, Fredericksburg, plans 1% completed permanent imprvs. for county airport, incl. landing strips and hangar, **$70,000.** Financing provided. CD 1/17—ENR 3/22.

Tex., Texas City—PARKS—City, E. A. Johnson, mayor, City Hall, parks, over **$100,000.** Financing not provided. Hare & Hare, 114 W. 10 St., Kansas City, Mo., consult. engrs.

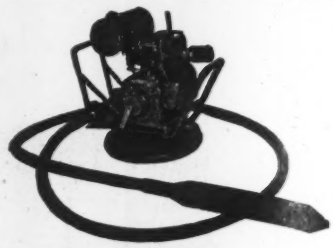
Tex., Texas City—RECREATIONAL FACILITIES, etc.—Town, E. A. Johnson, mayor, City Hall, recreational facilities, playgrounds, athletic courts, etc., over **$50,-000.** Financing not provided. Hare & Hare, 114 W. 10 St., Kansas City, Mo., consult. engrs.

Wash., Bellingham—SWIMMING POOL—City, A. H. Howard, mayor, City Hall, swimming pool. **$80,000.** Financing not provided. E. W. Gooch, City Hall, city engr.

★ **Wash., Seattle**—STADIUM, etc.—Seattle Park Dpt., 2334 4 Ave., Zone 1, stadium and field house at Lower Woodland Park, with track and baseball fields, etc. **$500,000.** Financing not provided. W. C. Hall, 2334 4 Ave., Park Dpt. engr.

READY FOR BIDS

Wis., Eau Claire—AIRPORT—City, O. E. Oien, clk., City Hall, plans completed airport, **$515,000.** CAA. A. R. Garnock, Eau Claire, city engr. CD 2/8—ENR 3/9.



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WATER SUPPLY

ROPOSED WORK

Mass., Andover—Town, C. T. Gilliard, supt. Wks., making plans 2 mi. 12 in. water-ain, Haggetts Pond Rd. Weston & Samp-n, 14 Beacon St., Boston, engrs.

N. Y., Poughkeepsie—Bd. P. Wks., City all, bids soon from revised plans, river take pipe and pump. station, $133,000. alcolm Pirnie, 25 W. 43 St., New York, Zone engrs. CD 4/10—ENR 4/12.

O., Cincinnati—City, City Hall, bids soon rnishing, laying 12 in. cement lined c.i. atermain in Vine St., from Paddock Rd. to ty corporation line and Elmwood Pl. 1,000. H. H. Kranz, City Hall, city engr.

Ore., Medford—City, City Hall, 8,200,000 gal. reinforced steel, concrete reservoir. 000,000. Cunningham & Associates, ilding Bldg., Portland, engrs.

R. I., Wakefield—Wakefield Water Co., 7 Ocean Rd., Narragansett, soon lets con-act water sys., 2 brick pumphouses, also peline and roadway, piping. Jenks & Bal-n, 2600 Industrial Trust Bldg., Providence, grs. CD 10/30—ENR 11/2.

Tex., Frankston—City, R. Perry, mayor, ity Hall, voted bonds, exten., imprv. WW. 0,250. CD 4/20—ENR 4/26.

IDS ASKED

Bids Asked After May 1

Tex., Yorktown—City, drilling, casing, de-eloping water supply well. $15,000.

Bids Asked May 9

N. Y., Brooklyn—Comr. Water Supply, Gas Electricity, Municipal Bldg., New York, one 7, hauling, laying water main, appur-nances in Avenue Z, Boerum, Wilson, West, 2 and E. 12 Sts. Plans deposit $1.

Bids Asked May 10

Ind., Fort Wayne—Comrs. Allen Co., J. A. rewer, aud., Court House, 100 x 100 ft., ein.-con. reservoir, two 400 gpm centrifugal umps, c.i. pipe, $25,000. Plans deposit 5. Extended date. R. W. Noland, 3709 hady Court, engr.

Bids Asked May 14

Pa., Aliquippa—Boro, Municipal Bldg., rilling, casing, developing, testing 2 single ased wells, well houses, pumps, furnishing, aying c.i. pipe, fittings, valves, valve boxes, onnection into present water supply sys. 0,000. Morris Knowles, Inc., 1213 Park ldg., Pittsburgh, engr.

Bids Asked May 15

†Ky., Outwood—Veterans Admin., Vermont ve. between H and I Sts. N.W., Wash. 25, . C., drilling, developing, testing 2 deep ells, Proj. 2375. CD 3/8—ENR 3/15.

N. Y., Hornell—Dpt. P. Wks., City Hall, ten. water supply and distr. sys. $150,000. m. S. Lozier, 10 Gibbs St., Rochester, engr.

Bids Asked May 16

Tenn., Johnson City—Mayor and Bd. City omrs., addnl. water supply facilities, incl. m.g.c.p.d. filtration plant, raw water pump. a., interconnecting pipelines. Wiedeman & ngleton, 1303 C & S Bldg., Atlanta, Ga., grs.

Bids Asked May 22

N. Y., Hornell—Dpt. P. Wks., City Hall, ten. water supply and distr. sys. $150,000. xtended date. Wm. S. Lozier, 10 Gibbs St., ochester, engr. CD 4/26.

Bids Asked June 5

†Ark., North Little Rock — Veterans dmin., Vermont Ave. between H and I Sts. W., Wash. 25, D. C., concrete water eservoir, Proj. 2400.

OW BIDDERS

Calif., Oakland—E. . Bay Municipal tility Dist., 512 16 St., Apr. 25, installing pprox. 4,565 lin. ft. 24 in. c.i. watermain rand Ave., between Sunnyside Ave., Pied-ont and El Embarcadero, in Oakland, LS o. 325, from Freethy & Fogelberg, 1432 earny St., El Cerrito, **$50,335.** CD 4/19.

†D. C., Wash.—U. S. Eng., 21 St. and Vir-inia Ave. N.W., Wash. 25, D. C., Apr. 23, peline, Chain Bridge, Contr. B, from Tuller onstr. Co., 95 Monmouth St., Red Bank, J., **$46,720.** CD 4/18.

Md., Towson—Comrs. Baltimore Co., Court ouse, Apr. 23, c.i. water lines in Middle-orough and Rockdale sections, from John atricciani & Sons, Baltimore, **$110,149.** CD /18.

Location of ENR Correspondents

Symbols and Abbreviations Include:

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Name in order of Listing)

Water Supply	Latin America
Sewers, Waste Disposal	Public Buildings
Bridges	Commercial Buildings
Streets & Roads	Industrial Buildings
Earthwork, Waterways	Unclassified

Stages Reported

PROPOSED: (except Streets & Roads): BIDS ASKED (new announcements only). For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Pa., Bethlehem—City, R. L. Fox, city engr., Apr. 10, 34 in. rein.-con. water supply line with appurtenances, from E. 3 St. to Dewberry Ave. and Main St., from Francis A. Canuso & Son, 804 S. 12 St., Phila., **$474,123.** CD 4/3—ENR 4/5.

Pa., Huntingdon—C. M. Woolworth, secy. Dpt. Property & Supplies, Apr. 25, pressure grout relining reservoir, from Cement Gun Co., Inc., 1520 Walnut St., Allentown, **$15,-230.** CD 4/13—ENR 4/19.

Tex., Houston—City, M. H. Westerman, secy., Apr. 25, installing 4,020 ft. 24 and 30 in. c.i. watermain Huchins St., approx. 1,200 ft. 16 in. c.i. watermain, Pierce St., from Bishop Brick Co., 2302 Jefferson St., **$59,698.**

Tex., Tyler—City, J. P. Ferrill mgr., Apr. 28, 1½ m.g. standpipe, appurtenances, from Pittsburgh-Des Moines Steel Co., Praetorian Bldg., Dallas, **$28,885.** CD 4/16—ENR 2/15.

CONTRACTS AWARDED

Mass., Ashland—Town, Water Comrs., 21,000 ft. 8 in. watermains, in 3 sects. of town, to I. Capaldi & Sons, Inc., 278 Silver Spring St., Providence, R. I. Est. **$45,000.** Bids 4/17. CD 4/12.

Tex., Monte Alto—Mid-Valley Cooperative Canning Co. and Rio Farms Inc., Edcouch and Monte Alto, water sys., incl. filtration plant, to Dodds & Wedegartner, Inc., 382 N. Bowie St., San Benito, **$62,078.** CD 4/12—ENR 4/19, under Industrial.

Tex., Fort Worth—Burrus Mill & Elevator Co., Colo Gulf Hy., drilling deep water supply well, to J. L. Myers & Son, Denton, **$19,590.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Colo., Aurora—City, sanitary sewer lines. $94,000. Applied to FWA for funds. C. H. Coberly, 1441 Welton St., Denver, engr. CD 4/5/44—ENR 4/13/44.

Colo., Colorado Springs—City, sanitary sewerage sys. imprvs. $125,000. Applied to FWA for funds. C. H. Coberly, 1441 Welton St., Denver, engr. CD 9/20—ENR 9/28.

Conn., Danielson—Boro of Danielson, D. M. Page, Court of Burgesses, tentative plans approved by State Health Dpt., for sewage disposal plant to correct pollution Quinebaug River. $110,000. Chandler & Palmer, 16 Franklin St., Norwich, engrs. CD 10/27—ENR 11/2.

†Ill., Nameoki Village—Village, sanitary sewerage lines to connect with Granite City sys. $64,000. **FWA.**

Mo., Warrensburg—City, $275,000 bond election June 5, storm and sanitary sewers. J. W. Shikles, Reliance Bldg., Kansas City, Mo., engr.

O., Columbus—City, repairing, remodeling furnaces at city garbage incinerators, Short St., south of Mound St. $34,750.

†S. D., Rapid City—Federal Works Agency, F St. between 18 and 19 Sts. N.W., Wash. 25, D. C., approx. 33,854 ft. 8- to 12-in. sewer lines, $57,500.

Tex., Dallas—Dallas County Water Control & Imp. Dist. 3, $75,000 bond election May 21, disposal plant and $135,000 sewerage sys. CD 4/20—ENR 4/26.

Tex., Fort Worth—City, S. H. Botherell, mgr., City Hall, making plans drainage in North Main St. $95,000. W. O. Jones, Fort Worth, dir. P. Wks.

Tex., Lubbock—City, c/o City Mgr., City Hall, received no bids Apr. 23, sanitary sewer imprvs., incl. sanitary sewer interceptor, approx. 6,808 ft. 10- to 22-in. sewer line, manholes, etc. A. L. King, city engr. CD 4/3—ENR 4/5.

Utah, Tooele—City, c/o N. Howard Jensen, mayor, City Hall, sewage disposal plant. $33,000. R. G. Harding, Utah Savings & Trust Bldg., Salt Lake City, engr. CD 11/29—ENR 12/7.

†Wash., Kennewick—City, City Hall, sewage disposal sys., with 7,200 ft. 8- to 30-in. sewers, $80,400. **FWA.** G. D. Hall, Larson Bldg., Yakima, engr.

BIDS ASKED

Bids Asked May 8

D. C., Wash.—District Comrs., District Bldg., Suburban Heights storm water sewers, south section, vicinity 51 St. and Hayes Sts. N.E. $45,585.

Bids Asked May 9

Calif., Los Angeles—City Bd. P. Wks., City Hall, sanitary sewers in Davan Rd. and Murietta Ave. $29,666. Bids 3/28 rejected. L. Aldrich, City Hall, engr. CD 4/5—ENR 4/12, under LB.

Bids Asked May 10

Ill., Chicago—Sanitary Dist. of Chicago, 910 S. Michigan Ave., furnishing, installing sludge pulverizer fdns., Cntr. 45-15 (SW-M).

Bids Asked May 15

Calif., Los Angeles—Los Angeles Co., Hall of Records, 14,550 ft. 6 and 8 in. vitr. clay sanitary sewer, manholes, etc., Frailey Ave., etc., CI 1070. $44,320. A. Jones, 700 Hall of Records, co. engr. CD 3/23—ENR 3/29.

Bids Asked May 18

Tex., College Station—A & M College, c/o C. K. Leighton, const. engr., A & M College, constructing 3 Dunbar filter beds and 3 sludge drying beds and pump pit at sewage disposal plant of college.

Bids Asked May 22

Calif., Los Angeles—Los Angeles Co., Hall of Records, 42,748 ft. 6- to 15-in. vitr. clay sanitary sewer, 115 structures, Gibson Ave., etc., CI No. 1095, $132,180; sanitary sewers, Verdun Ave., etc., C.I.-1101, $40,000. A. Jones, Hall of Records, co. engr.

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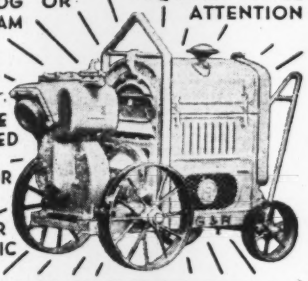

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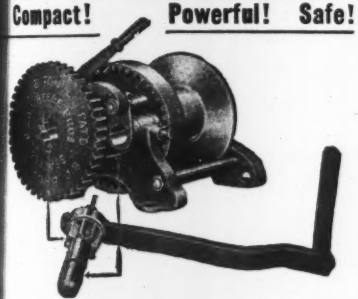

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SEWERAGE, etc. (Bids Asked, Cont'd.)

Tex., Weslaco—City, V. C. Thompson, secy.-mgr., City Hall, sanitary sewerage sys., addns., imprvs., incl. 6, 8 and 10 in. vitr. tile collection lines, manholes, 2 sewage lift pump stations, two 22 in. diam. concrete primary settling tanks at sewage treatment plant, etc. Plans deposit $10. Valco, Inc., M & M Bldg., Houston, engrs. CD 4/3—ENR 4/5.

Bids Asked May 21

Conn., Southington—Boros of Southington, Burgesses and Wardens, Town Hall, addnl. sewage settling tank. H. E. Bailey, 177 State St., Boston, Mass., engr.

LOW BIDDERS

Calif., Los Angeles—Bd. P. Wks., City Hall, 5,576 lin. ft. vitr. clay sanitary sewer house connections, repaving, etc., from M. Ramljak, 249 W. Mission Rd., San Gabriel, $25,987. Est. $39,263. CD 3/30—ENR 4/5.

Md., Towson—Baltimore Co., Court House, Apr. 23, sewerage pump. station, interceptor sewer and force main, from Ligon & Ligon 3210 Ridgewood Ave., Baltimore, $151,155. Est. $150,000. CD 4/18.

CONTRACTS AWARDED

Kan., Scott City—City, C. J. Van Antwerp, clk., sewage disposal plant, sewer exten., to Grundeman Constr. Co., Holton, $70,416. Bids 4/20. CD 4/10—ENR 4/12.

Ill., Chicago—Sanitary Dist. of Chicago, 910 S. Michigan Ave., furnishing, del. spare parts and appurtenances for miscellaneous equip., from Link-Belt Co., 307 N. Michigan Ave., $68,715. CD 4/20.

Mass., Worcester—City, Sewer Dpt., City Hall, H. Green, comr. P. Wks., sewer lines, various streets. Owner builds. $26,500. Appropriation voted.

BRIDGES

PROPOSED WORK

Ga., Atlanta — City, c/o H. Donaldson, Constr. Dept., widening, imprv. Boulevard Underpass. $250,000. Robert & Co., Bona Allen Bldg., engrs.

†Mont., Missoula—Pub. Rds. Admin., New Post Office Bldg., Portland, Ore., 600 ft. trestle-type bridge, Nine Mile Rd., $55,000.

Rhode Island—State Dpt. Hys. & Bridges, Providence, highway bridge, Westerly Rd., in Hopkinton, $125,000; bridge over Wood River and over railroad tracks, Nooseneck Hill Rd., in Hopkinton, $180,000. Charles Maguire & Assoc., 1515 Turks Head Bldg., Providence, engrs.

BIDS ASKED

Bids Asked May 11

California—State Div. Hys., Sacramento, repairing bridge across Sutter By-Pass about 11 mi. north of Knights Landing, Sutter Co. C. H. Whitmore, 703 B St., Marysville, distr. engr.

LOW BIDDERS

Illinois—State Div. Hys., Springfield, Apr. 20, rein.-con. substructure, paved concrete approaches, erecting plate girder superstructure for Illinois Central Railroad overhead, Court St., Kankakee, Kankakee Co., from Triangle Constr. Co., Kankakee, $46,851; fabrication of steel for same, from Bethlehem Steel Co., 400 N. Michigan St., Chicago, $18,525. CD 4/10—ENR 4/12.

N. Y., Brooklyn—Bd. Transportation, 250 Hudson St., New York, Zone 13, Apr 20, repairing viaduct structure Fulton St. Elevated on Pitkin Ave. from Georgia Ave. to Logan St., from Fichter Steel Corp., 60 E. 42 St., New York, $208,375. CD 4/11.

Wash., Porter—Grays Harbor Co., Courthouse, Apr. 23, bridge over Chehalis River, with timber piling, 230 ft. used steel span and steel piling, from J. G. Lundstrom, 2658 N.E. Tenino St., Portland, Ore. $37,279.

CONTRACTS AWARDED

Mass., Boston—Dpt. P. Wks., City Hall, construction work on Allston Bridge over Boston & Albany R. R., to F. W. Byron, 89 Lincoln St., Dedham, $40,804. Bids 4/10, awarded 4/23. CD 4/13—ENR 4/19, under LB.

Ia., Tipton—Cedar Co., Tipton, 22 x 180 ft., continuous I-beam bridge, to A. Olson Constr. Co., Waterloo, $33,404. Bids 4/25. CD 4/16—ENR 4/19.

STREETS AND ROADS

BIDS ASKED

Bids Asked May 8

†Maryland—Pub. Roads Admin., 1440 Columbia Pike, Arlington, Va., access road to Indian Head Naval Reservation (Bridge over Hudson Creek), Project MD-DA-NR- 4-E (3), Prince Georges Co. Plans deposit $10.

Bids Asked May 8

Mass., Falmouth—Bd. Selectmen, of Falmouth, at P. Wks. Dpt., Commonwealth of Massachusetts, 100 Nashua St., Boston, repairing Grand Ave. in Falmouth, Chapter 90 Project, for State, Barnstable Co. and Town, 100 Nashua St., Boston. $25,000 plus. Plans deposit $5.

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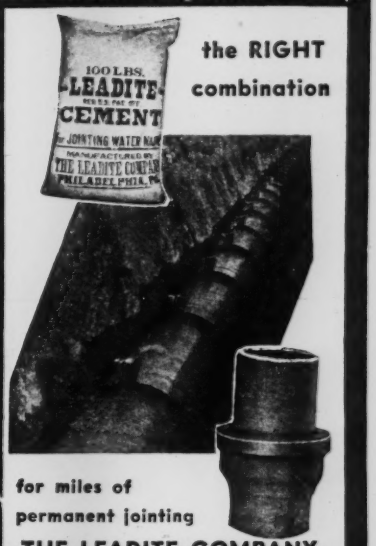

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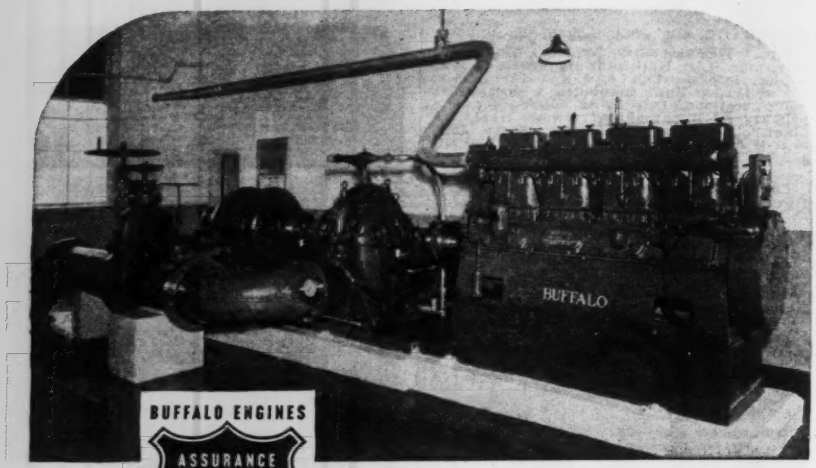

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STREETS and ROADS (Bids Asked, Cont.

Bids Asked May 9

Ill., Geneva—Clerk, Kane Co., Co... Bldg., 20 ft. bit. seal coat A-1 road-surf... ing 11.813 mi. roads, Maintenance A; 1... mi., Maintenance B. Over $25,000. C. L. H... son, County Bldg., co. supt. hys.

Bids Asked May 9

Kansas—State Hy. Dpt., Oberlin, bitu... nous material surfacing 12.717 mi. Proj. 3107, Decatur Co.; 5.019 mi. Proj. K-... Wallace Co.; bituminous sealing 16.092 ... Proj. 3793-ABC, Cheyenne Co.; 12.848 ... Proj. 3794-AB; 6.958 mi. Proj. 3795-AB, ... Decatur Co.; 6.652 mi. Proj. 3796, Ellis C... 17.046 mi. Proj. 3798-AB, 0.918 mi. P... 3799, 0.918 mi. Proj. 3500, Graham C... 15.665 mi. Proj. 3501-AB, Norton Co.; 1... mi. Proj. 3502; 13.252 mi. Proj. 3503, ... Phillips Co.; 10.05 mi. Proj. 3504, Raw... Co.; 21.452 mi. Proj. 3505-AB, Rooks C... 15.044 mi. Proj. 3506; 10.926 mi. Proj. 3... AB, 2.09 mi. Proj. 3508, all foregoing She... dan Co.; 9.353 mi. Proj. 3509, Sherman C... 19.646 mi. Proj. 3511-AB, Thomas Co.; 11... mi. Proj. 3512, Wallace Co.; resurfacing ... terial 5.587 mi. Proj. 3797, Gove Co.; 10... mi. Proj. 3510, Smith Co. R. C. Keel... Topeka, engr.

Bids Asked May 10

Ia., Algona—Bd. Supervs. Kossuth C... Algona, maintenance graveling vari... county roads, involving 85,000 cu. yd. grav... 600,000 units of addnl. haul, 15,000 cu. yd. ... stripping. Over $25,000. H. M. Smith, Algo... co. engr.

Bids Asked May 11

New Mexico—F. G. Healy, engr. State H... Dpt., Santa Fe, grading, minor drain... structures 3 multiple span concrete ... culverts each over 20 ft. clear span, balla... leveling course, black top surfacing, etc. ... mi. U. S. Hy. Route 66, between Gallup a... Fort Wingate, SN-A-FAP. 27(6), McKin... Co.

Bids Asked May 12

Louisiana—J. E. Diegle, secy. Acadia Pa... ish Police Jury, Crowley, furnishing sprea... ing 6,000 tons washed gravel 1,500 tons ... Jennings, 2,500 tons to Iota, 2,000 tons ... Egan.

†Md., Thurmont—National Park Servi... Region 1, Dpt. Interior, The Mosque, Lau... and Main Sts., Richmond, Va., bitumino... surfacing area road at Catoctin Recreation ... Demonstration Area.

Bids Asked May 15

†California—Pub. Roads Admin., 720 Ph... lan Bldg., San Francisco 0.208 mi. acc... road to Alameda Naval Air Station, Alame... Co., Calif. DA-NR-73 (2). C. Norris, Phel... Bldg., San Francisco, dist. engr.

Bids Asked May 15

Washington—State Hy. Dpt., C. Hick... dir. Hys., Olympia, resurfacing, bitumino... macadam Class D, penetration type and no... skid single seal treating 12.234 mi. St... Hy. 5, Enumclaw to the Dalles, King a... Pierce Counties; bituminous surface trea... ing, road-mix type, Class B, pre-seal a... nonskid single seal treating 44.87 mi. P... mary State Hys. 3 and 6, Spokane, Steve... and Pend Oreille Counties; manufacturi... stockpiling crushed cover stone and miner... aggregate on Primary State Hy. 9, Hum... tulips to Quinault Indian Reservation, Gra... Harbor Co. Plans deposit $2 each.

Bids Asked May 16

California—State Div. Hys., P. W... Bldgs., Sacramento, rock base and pla... mix surfacing about 13 mi. road betwe... 1.7 mi. east of San Luis Creek and L... Banos and between 1.7 mi. north of Rom... School and Los Banos, Merced Co.; crush... run base and plant mix surfacing 2.4 ... road between Mission San Jose and War... Springs, Alameda Co.; asphaltic concr... and plant mix surfacing 9.5 mi. road ... tween Zaca and Pismo Beach, Santa Ba... bara and San Luis Obispo Counties; ... treated rock base and plant mix surfac... 4 mi. road between Franklyn St. in city ... Modesto and Stone Ave., Stanislaus Co.; ... mi. road between Route 5, about 2.5 mi. s... of Tracy, and approx. 2 mi. southerly, S... Joaquin Co. G. T. McCoy, Sacramento, sta... ry. engr.

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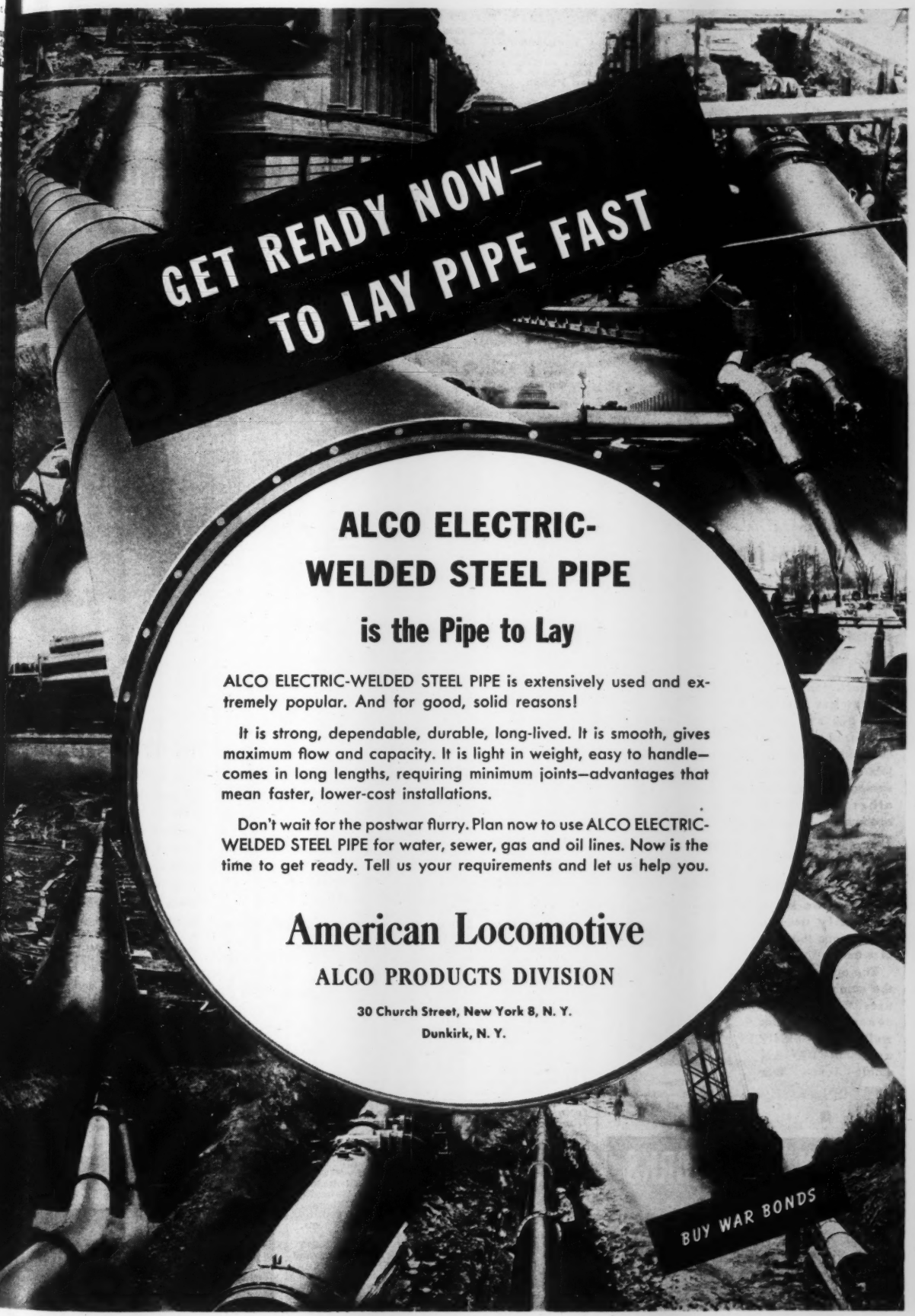
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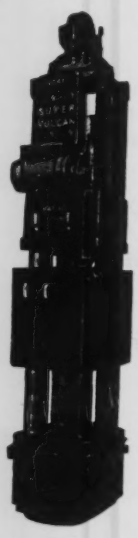

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STREETS and ROADS (Bids Asked, Cont'd.)

Bids Asked May 16

Louisiana—Dpt. Hwys., D. Y. Smith, dir., Baton Rouge, bituminous surface on clam shell surface treating, etc. 1.272 mi. Labarre Rd., State Route 1231, S.P. 826-20-02, Jefferson Parish. Plans deposit $1.

Bids Asked May 21

Ia., Garner—Bd. Supervs. Hancock Co., constructing Drainage Dist. 139, involving 30,500 cu. yd. earth excav., placing 60 ft. 60 in. concrete pipe, 10 cu. yd. bulkhead concrete, 12,347 lin. ft. 6- to 26-in. drain tile furnish and install two 12 in. intakes. Over $15,000. Wm. Henschen, Garner, drainage engr.

Bids Asked May 21

Minnesota—State Hy. Dpt., St. Paul, application approx. 150,000 gal. bituminous material, furnish and apply approx. 265 cu. yd. mineral aggregate, load and haul from stockpiles and apply approx. 3,576 cu. yd., and approx. 620,175 sq. yd. surface treatment, approx. 41 mi. Group 1 Maintenance Dists. 12, 13 and 14; application approx. 272,000 gal. bituminous material, load and haul from stockpiles and apply approx. 9,125 cu. yd. mineral aggregate and approx. 1,191,179 sq. yd. surface treatment, approx. 77 mi. Group 2, Maintenance Dist. 15; application approx. 198,000 gal. bituminous material, furnish, apply approx. 1,385 cu. yd. mineral aggregate, load and haul from stockpiles and apply approx. 4,057 cu. yd., approx. 757,351 sq. yd. surface treatment, approx. 50 mi. Group 3, Maintenance Dists. 10 and 16; applying approx. 230,000 gal. bituminous material, load and haul from stockpiles and apply approx. 6,008 cu. yd. mineral aggregate, and approx. 1,011,818 sq. yd. surface treatment, approx. 72 mi. Group 4, Maintenance Dists. 6 and 8; application approx. 210,000 gal. bituminous material, load and haul from stockpiles and apply approx. 6,327 cu. yd. mineral aggregate and approx. 839,664 sq. yd. surface treatment approx. 60 mi. Group 5, Maintenance Dists. 1 and 3. O. L. Kipp, ch. engr.

Bids Asked May 22

Ala., Birmingham—Jefferson Co. Comn., Birmingham, resealing 0.6 mi. Powderly-Ishkooka Rd.; 4.7 mi. Hueytown-Taylor's Ferry Rd.; 0.6 mi. Powderly-So. Bessemer Rd.; 0.6 Hueytown-Crest Rd.; 8.5 mi. North Bessemer-Bessemer Rd.; 4 mi. Mt. Pinson-Camp Cosby Rd.; 6.1 mi. Mt. Pinson-Bradford Rd.; 0.6 mi. Bessemer-West Lake Rd.; 0.6 mi. North Birmingham-Sayreton Rd.; 2.7 mi. Wylam-Minor High School Rd.; 5 mi. Thomas-Republic Rd.; 0.6 mi. Roebuck-Circle Rd.; 3.7 mi. Lewisburg-New Castle Rd.; 0.4 mi. Trafford-Warrier Rd.; 4.6 mi. Roebuck-County Line Rd.; 4 mi. Graysville-Flat Top Rd.; 6 mi. Tarrant-Mt. Pinson Rd.; 3.5 mi. Huffman-Chalkville Rd.; 1.5 mi. Homewood-Green Springs Rd.; 3.5 mi. Edgewood Lake to U. S. Hy. 31; leveling, sealing 0.7 mi. Wilson Avenue (Powderly District); 0.7 mi. Bessemer-Brighton Rd. C. J. Rogers, co. engr.

Bids Asked June 27

★**British Columbia**—Dpt. P. Wks., Victoria, 150 mi. highway from Prince George to Dawson Creek, to be split into 2 sections, Summit Lake to Mile 94 and Azouzetta Lake to Commotion Creek, involving clearing, grubbing 3,000 acres, grading 4,500,000 cu. yd. and laying 375,000 yd. crushed gravel. $6,000,000. A. L. Carruthers, c/o Dpt. P. Wks., engr.

Bids Asked

†**Tex., McGregor**—U. S. Eng., 307 Post Office Bldg., Galveston, resurfacing roads at Bluebonnet Ordnance Plant, Ser. W-41-243-eng-45-MI-17.

Tex., Houston—City, M. H. Westerman, secy., City Hall, rejected bids Mar. 28, paving Tremper, Hoffman, Hahlo and Woolworth Sts., CD 4/3—ENR 4/5, under LB.

LOW BIDDERS

California—State Div. Hys., State Bldg., Los Angeles, imprv. 12.7 mi. Route 64, Riverside Co., from R. R. Hensler, 816 Allen Ave., Glendale, $41,965. CD 3/30—ENR 4/5.

California—State Div. Hys., Sacramento, Apr. 25, imprv. 3.2 mi. Placer Co., from R. A. Westbrook, 1231 C St., Sacramento, $25,430. CD 4/9—ENR 4/12.

★**Illinois**—State Div. Hys., Springfield, Apr. 20, imprv. 5.83 mi. U.S. Route 34 from Standard Paving Co., 30 N. La Salle St., Chicago, $210,394; 6.34 mi. U.S. 34, from Hartong & Co., 33 N. La Salle St., Chicago, $180,128, both foregoing Du Page Co.;*** 5.02 mi. Du Page and Kane Counties, from Black Top Roads Co., 1929 N. Narragansett St., Chicago, $158,455***7.26 mi. Iroquois Co., from Granite Bituminous Paving Co., 3943 Duncan St., St. Louis, Mo., $205,688***5.92 mi. Jersey Co., from Bridges Asphalt Paving Co., 1411 Central Industrial, St. Louis, Mo., $118,131***5.16 mi. Kane Co., from Geneva Constr Co., Aurora, $152,720***5.77 mi. Lake Co., from Peter Baker & Sons, Lake Forest, $111,867***15.85 mi. Livingston, Kankakee and Grundy Counties, from White Consolidated, Inc., 1735 W. Fullerton St., Chicago, $269,125***10.36 mi. Macon Co., from Collins Constr. Co., Decatur, $302,916***3.12 mi. Madison Co., from Thompson Asphalt Co., 1st Natl. Bank Bldg., East St. Louis, $55,645***4.76 mi. Sangamon Co., from Sangamo Constr. Co., 700 N. MacArthur Blvd., Springfield, $144,622***imprv. 20.89 mi. S.B.I. Route 16, Shelby and Christian Counties, from Joyce Bros. Contr. Co., 918 Myers Bldg., Springfield, $84,551. CD 4/10—ENR 4/12.

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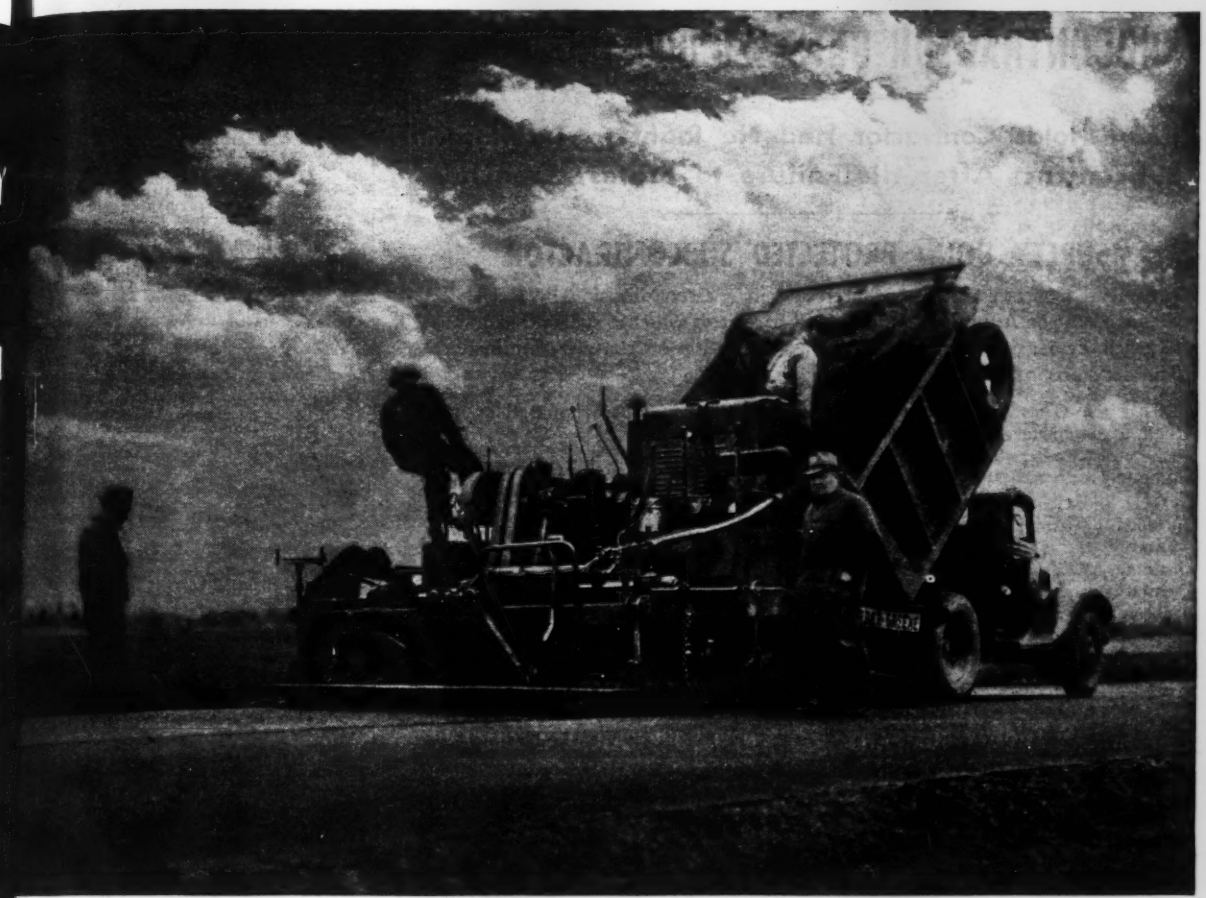

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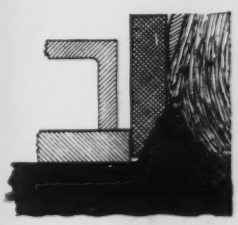

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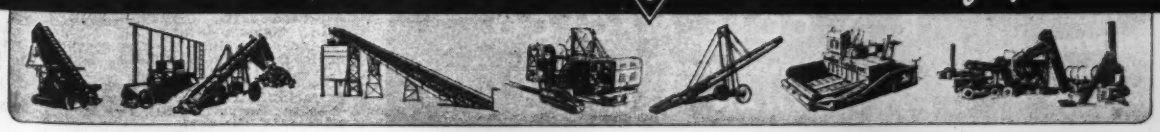

SUBCONTRACTOR GETS $20,000 JUDGMENT

Court Holds Contractor Had No Right to Terminate Subcontract After His Failure to Protest Breaches

SURETY BOND PROTECTED SUBCONTRACTOR

General Contractors will be interested in a recent decision by the U. S. Circuit Court of Appeals for the Second Circuit in which a subcontractor was awarded damages of some $20,000 as the result of contract termination. The decision brought out:

That the General Contractor had no right to terminate the contract with the Subcontractor after the former had failed to protest the breaches;

That the General Contractor was not justified in terminating the contract because of the Subcontractor's failure to maintain an excavation schedule when the contract contained a clause protecting the Subcontractor against "unforeseeable causes beyond the control and without the fault or negligence of the Subcontractor;" and

That the Subcontractor's claim was not limited by the contract price or unit price per cubic yard. That he was entitled to recover for proper expenditures in performance, or for extra work and to make use of the contract as fixing the basic price.

Of special importance to the Subcontractor was the fact that he was protected against loss by a CONTRACT BOND.

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NEWNAN, GEORGIA

STREETS and ROADS (Low Bidders, Con

Ia., Pocahontas—Pocahontas Co., P... hontas, Apr. 5, maintenance gravel surf... ing, from Ferguson & Diehl Constr., ... Jefferson, **$38,575.** A. L. Thornton ... co. e...

Ia., Sioux City—Bd. Supervs. Woodb... Co., Sioux City, Apr. 9, imprv. 280.6 ... various secondary roads, from John Sc... macher, Bancroft, **$55,016.** J. C. McLa... co. engr. CD 3/27—ENR 3/29.

Louisiana—State Hy. Dpt., Baton Rou... Apr. 25, imprv. 16.9 mi. Calcasieu Par... from R. M. Lilly, Fidelity Bank Bldg., Ba... Rouge, **$46,821;** furnishing, spot dump... 8,400 cu. yd. washed gravel, Tensas Par... from Monroe Sand & Gravel Co., Ba... Rouge, **$41,556.** CD 4/16—ENR 4/19.

Maryland—State Roads Comn., Baltimo... Apr. 24, imprv. 2.3 mi. Contr. Ho 219-1... Howard Co., from Eastern Highways Co... Brooklyn St., Baltimore, **$101,654.** CD ... —ENR 4/19.

Mass., Boston—City, Dpt. P. Wks., C... Hall, Apr. 26, sheet asphalt paving C... bridge St. from Soldiers Field Rd. to Bo... & Albany R.R. bridge, from John P. C... don Corp., 105 Coolidge Hill Rd., Watertow... **$44,350.**

Md., Baltimore—City, Bd. Awards, C... Hall, Apr. 26, concrete paving alleys, Con... 166, from Paramount Constr. Co., 3700 Gor... St., **$37,928.**

Mo., Kansas City — Jackson Co., Co... House, 12 and Oak Sts., furnishing, appl... road oil on 850 mi. roads, from Mid-w... Precote Co., 7600 E. 17 St., Kansas City, M... **$173,200.**

N. Y., Rochester—Dpt. P. Wks., A. ... Wagener, dir., 54 Court House, Zone 4, A... 27, paving Clifford Ave., from A. Petro... 2401 St. Paul Blvd., **$37,165.** CD 4/20.

North Carolina—State Hy. & P. W... Comn., Raleigh, Apr. 24, from F. D. Cli... Fairview Rd., Raleigh, imprv. 28.78 ... Rockingham, Caswell and Guilford Counti... **$42,515;** 6.9 mi. New Hanover Co., **$84,1...** 4 mi. Cumberland Co., **$58,623***** from J. ... Gregory, Odd Fellows Bldg., Raleigh, impr... 31.32 mi. Davidson Co., **$46,998;** 33.8 ... Davidson and Randolph Counties, **$57,20...** from Dickerson Co., Monroe imprv. 15 ... Brunswick Co., **$103,356.** W. V. Ba... Raleigh, state hy. engr. CD 4/17—EN... 4/19.

Pennsylvania—State Hy. Dpt., Harrisbu... Apr. 24, imprv. 1.56 mi. Bucks Co., fro... Francis A. Canuso & Son, 804 S. 12 St... Phila., **$65,248***** 3.89 mi. Clarion Co., fro... The Baldwin Brothers Paving Co., Uni... Common Bldg., Cleveland, O., **$188,063***** ... mi. Lawrence Co., from The Kelley & Mey... Co., Dollar Bank Bldg., Youngstown, O... **$35,178***** 0.79 mi. Luzerne Co., from Geor... Powell Constr. Co., Nanticoke, **$36,44...** 2.32 mi. Mercer Co., from Johnston & Mc... Intyre, Sharon, **$35,213***** 5.5 mi. Washingto... Co., from Tri-State Asphalt Corp., Martin... Ferry, O., **$94,419***** 1.26 mi. York and Lan... caster Counties, from McMinn's Industria... Inc., Lancaster, **$43,052.** CD 4/10—ENR 4/1...

★**Tennessee**—State Hy. Dpt., Nashvill... Apr. 27, imprv. 5.498 mi. Hy. 61, Ander... son Co., from H. E. Wolfe Const. Co. ... J. B. Michael, St. Augustine, Fla., **$497,30...** 6.772 mi. State Hy. 9, Anderson Co., fro... Wright Contg. Co., Columbus, Ga., **$744,91...** CD 4/10—ENR 4/12.

†**Virginia**—Pub. Roads Admin., 1440 Colum... bia Pike, Arlington, Apr. 20, access roads ... Annex Bldg., Proj. FA-DA-NR-39, Rev. ... 16-45, from W. H. Armstrong, 1334 31 St... N.W., Wash., D. C., **$29,283.** CD 4/16.

CONTRACTS AWARDED

Connecticut—State Hy. Dpt., Wm. J. Cu... comr., Hartford, imprv. 5,393 ft. road, Sim... bury and 2,560 ft. road, Union, to S. & M... Constr. Co., Manton Ave., Providence, R. ... **$28,906.** Bids 4/23. CD 4/16—ENR 4/19.

†**Fla., Daytona Beach**—U. S. Eng., Pos... Office Bldg., Savannah, Ga., drainage, grad... ing, etc., to J. D. Manly Constr. Co., Lee... burg, **$87,237.**

Georgia—State Hy. Dpt., Atlanta, impr... 5.051 mi. Calhoun and Dougherty Counties ... and 9.3 mi. Putnam and Baldwin Counties ... to Ledbetter-Johnson, Rome, **$28,888** and ... **$27,522** respectively; 25.4 mi. Hart, Elber... and Franklin Counties, to E. H. Hinto... Greenwood, S. C., **$37,612.** Grand total $94,... 022. Bids 4/18. CD 4/11.

Ga., East Point—City, A. Laney, mayor... resurfacing 1 street and surfacing 6 streets ... to S. E. Finley, 292 North Ave. N.W., Atlanta... **$26,670.**

Ia., Adel—Dallas Co., Adel, maintenance ... surfacing various secondary roads, to Kass... Constr. Co., Adel, **$58,313.** Awarded 4/... L. W. Croft, co. engr.

Ia., Clinton—Bd. Supervs., Clinton Co.... Clinton, crushed stone surfacing various sec... ondary roads, to Clinton Stone Products Co.... Clinton, **$31,915.** Bids 4/16. CD 4/10.

Ia., Garner—Hancock Co., Garner, grav... surfacing various secondary roads, to Sylva... C. Oleson Constr. Co., Forest City, **$41,68...** Bids 4/23. CD 4/16.

Ia., Hampton—Franklin Co., Hampton, ... grading, etc., various secondary roads, ... E. M. Duesenberg, Clear Lake, **$34,30...** Awarded 4/16. CD 4/20—ENR 4/26.

Ia., Nevada—Story Co., Nevada, main... tenance graveling various secondary roads ... to R. Cook, Ames, **$79,533.** Bids 4/18. CD ... 4/10—ENR 4/12.

Ia., Waterloo—Blackhawk Co., Waterloo ... surfacing various secondary roads, to M. C... Weaver, Inc., 539 5 St., Des Moines, **$62,50...** Bids 4/23. CD 4/17.

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STREETS and ROADS (Contracts Awarded Cont'd.)

Ill., Woodstock — McHenry Co., Court Bldg., imprv. 4.0094 mi. 3 IT-MFT, to Sub-ban Oil Co., Crystal Lake, **$28,307.** Bids 4/3. C. L. Tryon, County Bldg., engr.

Minnesota—State Hy. Dpt., St. Paul, crushing, screen, load and haul about 25,130 cu. yds. gravel for gravel surfacing and stockpiling for Maintenance Div., at Marshall, to Zaske, Danube, **$26,517.** Bids 4/18. CD 4/3—ENR 4/5.

Minn., St. Peter—H. Overn, aud. Nicollet Co., St. Peter, regravelling state aid road to Haferman & Stark, Jordan, Minn., **$49,7**. Bids 4/9. CD 4/4.

N. C., Morganton—Town, bituminous concrete surfacing, to R. B. Tyler Co., Mount, **$29,100.** Bids 4/24. R. O. Wallace, town engr.

Pa., Brentwood (br. Pittsburgh)—Boro, F. H. Appenroot, secy., Municipal Bldg., Brentwood, Pittsburgh, grading, concrete paving, curbing, Shadewell and Olanda Aves., to D. Carapallucci, 130 Mayfield St., Pittsburgh, **$26,080.** R. A. Schneider, 10 Brownsville Rd., Pittsburgh, boro engr.

Pa., Pittsburgh—City, F. M. Roessing, dir. Dpt. P. Wks., City County Bldg., regrading, recurbing, street resurfacing, involving approx. 25,000 tons binder and 18,000 tons asphalt to Allegheny Asphalt & Paving Co., 411 Blvd. of Allies, **$384,155.** Est. $400,0

Tex., Dallas—City, City Hall, 5 mi. stree asphalt penetration topping, 14 mi. asphalt resurfacing of streets, force account. $150,0

★ **Virginia**—State Dpt. Hys., Richmond furnishing, applying bituminous materials and covering material Class B, Staunton Dist., to A. B. Torrance & Co., Box 10 Elkton, **$97,592*****Class B, Lynchburg Dist. to J. R. Ford Co., Inc., 1223 Fillmore St., Lynchburg, **$265,602*****Class B, Salem Dist. to Sam Finley, Inc., P. O. Box 2389, Roanoke, **$198,069*****Class B, Culpepper Dist., to Th Union Building & Constr. Corp., 631 Main Ave., Passaic, N. J., **$145,255*****Class B, D, Richmond Dist., to W. M. McIntosh, Inc Boulevard & Ellen Rd., Richmond, $221, ***furnishing, applying bituminous materials and covering material, Schedule 1, Class C, Bristol Dist., to Pendleton Constr. Corp. Wytheville, **$120,999*****Schedule 2, Class C Bristol and Lynchburg Dists., to F. D. Cline Greensboro, N. C., **$358,631*****Schedule 1 Class C, Bristol Dist., to Virginia Asphalt Paving Co., Inc., P. O. Box 630, Roanoke, **$189,214*****Schedule 4, Class C, Bristol Dist. to Carter Brothers, Inc., 2924 W. Marshall St., Richmond, **$196,812*****Class C, Suffolk Dist., to Short & Thompson, Inc., P. O. Box 29, Hopewell, **$498,691*****Class C, Staunton Dist., to Nelson H. Clark & Sons, Inc., Luray, **$111,690*****furnishing, applying bituminous material Class D, Fredericksburg Dist., to W. M. McIntosh, Inc., and The James Gibbons Co., Boulevard & Ellen Rd., Richmond, **$113,443*****Class D, Culpepper Dist., to Tri Asphalt Service, Inc., P. O. Box 7, New Brunswick, N. J., **$105,852.** Grand total $2,624,940. CD 3/29—ENR 4/5, under LB

Wash., Colfax—Whitman Co., Court House, crushed stone surfacing 11 mi. Lubben Rd., to Nyberg Constr. Co., Yardley. $28,5 Est. $25,000. J. H. Redmond, co. engr. Bids 4/21.

Alta., Vermilion—Municipality, J. J. Parr, clk., cement walks and curbs, graveling and grading, day labor. **$31,500.**

EARTHWORK, WATERWAYS

PROPOSED WORK

†**Tex., Dallas**—U. S. Eng., 231 W. Main St., Denison, cancelled bids to have been opened Apr. 23, levee repairs, Dallas Co. Dist. C East Fork Trinity River, incl. approx. 87,6 cu. yd. embankment, etc. Will readvertise CD 4/3—ENR 4/5.

BIDS ASKED

Bids Asked May 15

†**Rhode Island**—U. S. Eng., 819 Industrial Trust Bldg., Providence, shore protection, concrete and riprap, Spec. 45-12, at Sakonnet Point. **Over $25,000.**

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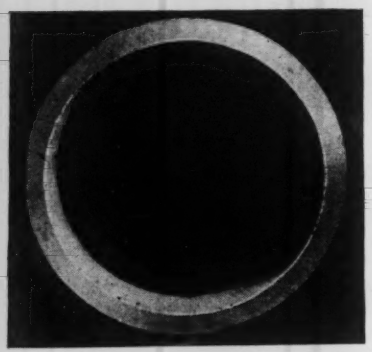

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EARTHWORK, WATERWAYS (Bids Asked, Cont'd.)

Bids Asked May 26

†**Nebraska**—Bureau of Reclamation, Dpt. Interior, Hemingford, earthwork, structure, Sturgeon and Fairfield laterals and sub-laterals, Mirage Flats Projects, Spec. 1098; adv. ENR 5/3.

LOW BIDDERS

Ill., Bowling Green—Wood Co., Bowling Green, Apr. 19, Needles Branch and Middle Branch of Portage River Joint Count Ditch imprv., 198,973 cu. yd. earth work, etc., from Launder & Son, Inc., Glendale, Toledo, O., **$61,251.** Est. $69,973. M. Berry, co. engr.

★**Calif., Napa**—City, City Hall, Apr. 24, Conn Creek dam, appurtenances, from Morrison-Knudsen Co., Inc., 111 Sutter St., San Francisco, Item 2a, **$537,767.** CD 3/26—ENR 3/29.

†**Mont., Glendive**—Bureau Reclamation, Terry, Apr. 23, earthwork, pipelines, structures, intake pump. plant and laterals on intake project, Spec. 1801-D, from M. G. Long, Billings, **$24,806.** CD 4/3—ENR 4/5.

†**Tex., Houston**—U. S. Eng., 25 St. and Avenue F, Galveston, Apr. 26, dredging Houston Ship Channel and turning basin (CI-5), from Standard Dredging Co., 90 Broad St., New York, N. Y., approx. **$451,600.** CD 4/13.

CONTRACTS AWARDED

†**Calif., Oakland**—U. S. Eng., 74 New Montgomery St., San Francisco, dredging Oakland Outer Harbor, to Olympian Dredging Co., 525 Market St., San Francisco, **$33,948.** CD 3/26—ENR 3/29.

Calif., Oakland—Bd. Port Comrs. City of Oakland, foot of Grove St., redredging 35,000 cu. yd. adjacent to Port of Oakland piers at Outer Harbor Terminal, to Olympian Dredging Co., 525 Market St., San Francisco, **$15,855.**

Calif., Oakland—Bd. Port Comn., foot of Grove St., redredging 108,000 yd. adjacent to piers at Outer Harbor Terminal, to Sanfrancisco Bridge Co., 503 Market St., San Francisco, **$41,040.**

Mass., Chatham—Town, Bd. Selectmen, Town Hall, Contr. 1, dredging Aunt Lydia's Cove in connection with fish pier project, to American Hydraulic Dredging Co., 224 Chestnut St., Newton, **$18,624.** Bids 4/27. CD 3/30—ENR 4/5.

Mass., Oak Bluffs—Commonwealth of Massachusetts, Dpt. P. Wks., 100 Nashua St., Boston, rebuilding concrete seawall and resurfacing sections along Sea View Ave., to Berke Moore Co., Inc., 11 Boylston St., Boston, **$68,500.** Bids 2/20, awarded 4/25. CD 2/6—ENR 2/8. under Massachusetts.

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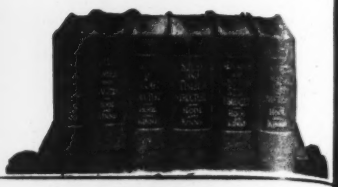

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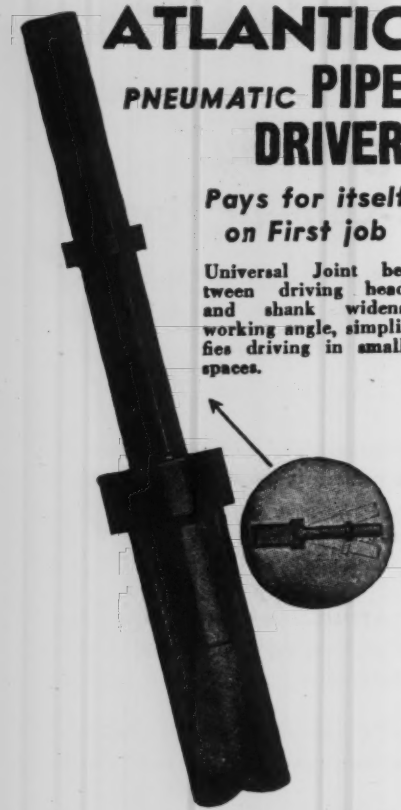

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EARTHWORK, WATERWAYS (Contracts Awarded, Cont'd.)

Neb., Hastings—Central Nebr. PP & Irr. Dist., Hastings, Group 16B, excav. and drainage ditch, vicinity of here, to Claussen & Olson, Holdredge, $71,378. Bids 4/9.

†**Tex., Kaufman**—U. S. Eng., 221 W. Main St., Denison, levee repairs, Kaufman Co., Levee imprv., Dist. 6, Ser. 41-242-45-106, to Daniels Constr. Co., 803 Amicable Bldg., Waco, approx. $15,000.

LATIN AMERICA

Mexico, Ciudad Juarez—Municipal Govt., Palacio Municipal, C. Juarez, Chihuahua, plans street paving, sewage and waterworks. $815,000.

Mexico, Mexico City—Alumino Industrial Mexicano, S.A., Ejido, 43-503 Mexico, D.F., Mexico, plans aluminum and manganese products foundry. $615,000. Site purchased.

Mexico, Mexico City—Criscar, S. A. V. Carranza, 48-408, Mexico, D.F., plans factory. $100,000.

Mexico, Mexico City—Fundiciones de Hierro y Acero, S. A., V. Carranza, 44, 2nd flr., Mexico, D. F., plans foundry. $250,000.

Mexico., Orizaba—Cemento Veracruz, S.A., V. Carranza, 53, Mexico, D.F., Mexico, plans cement factory. $615,000.

Mexico, Saltillo—State Govt., Palacio del Estado, Saltillo, Coahuila, plans state university. $1,150,000.

Mexico, Tlalnepantla — Municipal Govt., Palacio Municipal, Tlalnepantla, plans slaughterhouse. $105,000.

PUBLIC BUILDINGS

PROPOSED WORK

★ †**Calif., Oakland**—U. S. Eng., 74 New Montgomery St., San Francisco, Zone 19, Postal Concentration Center 2, containing 300,000 sq. ft. floor space at Oakland Army Base, relocation present motor pool of Camp John T. Knight, providing utilities, incl. railroad tracks, roads, street lighting, etc. $2,000,000.

★ †**Ore., Troutdale**—Bonneville Power Admin., P. O. Box 3527, Portland, substation addns. $890,000.

★ **Ont., Toronto**—Bd. Directors Sick Children Hospital, R. A. Laidlaw, chn., sketches by Govan, Ferguson & Lindsay, 515 Jarvis St., 19 story bsmnt., hospital for sick children, University Ave., Gerrard and Elizabeth St. $6,000,000. CD 6/20—ENR 7/6.

★ †**Washington**—Bonneville Power Admin., P. O. Box 3537 Portland, Ore., substations at Columbia (addn.) $615,000; Snohomish $1,566,000; Chehalis (addn.) $86,800; Shelton $255,000; Potlatch $97,300; Fairmont $679,000; Grandview $250,000; Midway (addn.) $84,000; Trentwood (addn.) $110,000; Colfax (addn.) $81,000; Spokane (addn.) $60,500; Chewaiah $76,000; Colville $76,000; Aladdin $55,300; Ellensburg (addn.) $160,000.

★ †**Wash., Seattle**—Pub. Housing Auth., NHA., Skinner Bldg., 5 and Union Sts., Seattle, Zone 1, 400 family dwellings and 200 dormitory units. $1,000,000.

Wash., Seattle — Foster School Dist., Seattle, plans by W. A. Mallis, Lyon Bldg., 3 and James St., Zone 4, 1 and 2 story masonry addns. to Showalter School at Foster, south of here. $230,000. Seeking FWA funds.

†**Wash., Silverdale**—Central Kitsap County School Dist., Silverdale, 3 classroom and storeroom addn., $35,000. FWA.

†**Wash., Poulsbo**—Kitsap County School Dist., Paulsbo, school addn. $60,000. FWA.

†**Wash., Union Gap**—school addn., $16,000. FWA.

★ †**Wash., Tacoma**—Pub. Housing Auth., NHA., Skinner Bldg., 5 and Union Sts., Seattle, Zone 1, 300 temporary family dwelling units for employees of Pacific Naval Advance Base. $600,000.

†**Wis., Merrimac**—Federal Works Agency, 18 and F Sts. N.W., Wash. 25, D. C., constructing, equipping 9-classroom school. $88,014.

†**Wis., Waukesha**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., plans by F. J. Hoffman, 201 6 St., Racine, dismantling prefabricating houses in Manitowoc and reerecting here, incl. landscaping, roads, sidewalks; water, gas and electric utilities Wis. 47-096 and 47-097.

BIDS ASKED

Bids Asked May 7

†**N. J., Elizabeth**—Elizabeth Housing Auth., 688 Maple Ave., site imprvs., N.J. 3-1 and 3-2 for NHA. Plans deposit $5. L. V. Pohlman, 1140 E. Jersey St., archt.

Bids Asked May 10

†**Wash., Vancouver** — Federal Works Agency,, Alaska Bldg., 2 and Cherry Sts., Seattle, Zone 4, alterations, renovations and addns. to MacArthur School, Marshall School and McLaughlin Junior High School. $34,000. D. J. Stewart, Central Bldg., archt. CD 3/28—ENR 4/5.

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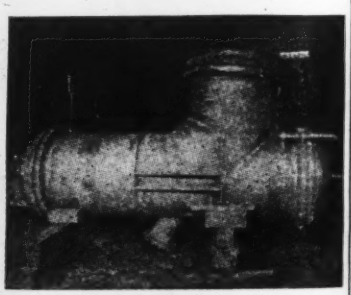

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The Army called for the roughest, toughest truck that could be built, designed to *begin* its job where most other trucks stop.

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TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC.

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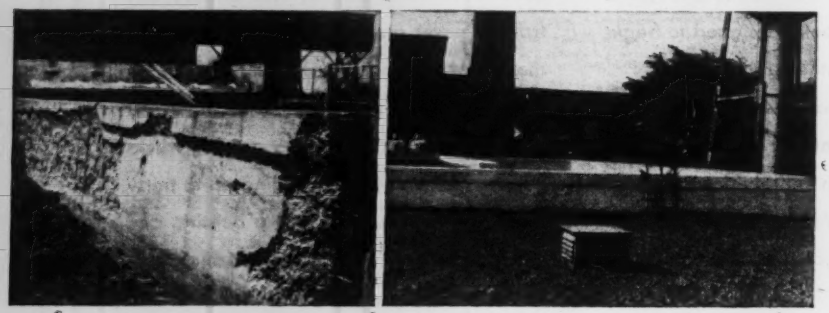
GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



"GUNITE" SAVES COMPLETE REBUILDING

The above are "before" and "after" photographs of a sedimentation basis at the water works of the City of Batavia, New York, which was restored by us in May, 1944, under the direction of Mr. Fred F. Gordon, Consulting Engineer.

As shown to the left, the original concrete walls of this basin were badly deteriorated. All disintegrated concrete was chipped out to a solid surface and reinforcing mesh bolted in place. An average of more than two inches of "GUNITE" was placed on the inside and outside of the walls. The filter beds at the same plant were similarly restored.

Our Bulletin 2200 describes scores of cases where "GUNITE" has saved failing concrete structures of every description, together with numerous other applications for both repair and new construction. A copy will be sent upon request, without obligation.

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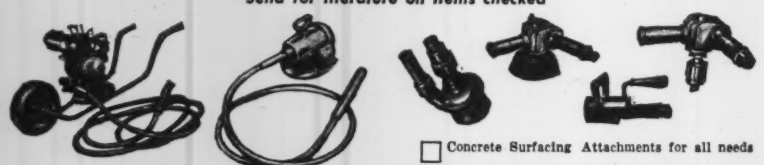

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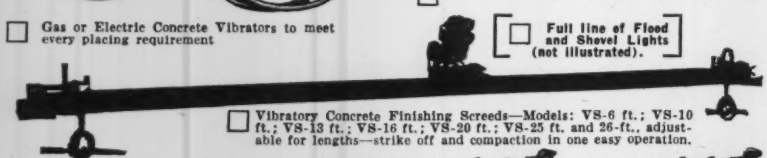

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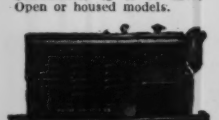

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PUBLIC BUILDINGS (Bids Asked Cont'd.

Bids Asked May 11

†**Calif., San Diego**—Pub. Bldgs. Admr., 18 and F Sts., N.W., Wash. 25, D. C. Paradise Hills School, 6 classrooms and 1 kindergarten unit, Calif. 4-650-1. FWA, C... 4/3—ENR 4/5.

Bids Asked May 15

†**Calif., Rodeo**—Federal Works Agency, 2223 Fulton St., Berkeley, fire station, Calif. 4-678 CF. Plans deposit $10. Dragon ... Schmidts, 2068 Allston Way, Berkeley, archts. CD 3/21—ENR 3/29.

Bids Asked May 15

†**Miss., Stoneville**—Div. Purchases, Sales & Traffic, Dpt. Agriculture, Wash. 25, D. C. 32 x 100 ft. with ell 32 x 28 ft. laboratory at U. S. Cotton Ginning Laboratory, Inv. 621-4... Plans deposit $2.

Bids Asked May 16

†**Alaska, Anchorage**—Pub. Housing Auth., Skinner Bldg., 5 and Union St., Seattle 1, Wash., forty 2 story, frame dwellings. Project 50084. Naramore, Bain, Brady & Johanson, Smith Tower, 2 and Yesler Sts., Seattle 4, Wash., archts. CD 4/11—ENR 4/19.

Bids Asked May 16

†**Alaska, Fairbanks**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle 1, Wash., fifty 2 story dwellings, central steam heating, Projects 50077 and 50082. $350,000. Naramore, Bain, Brady & Johanson, Smith Tower, 2 and Yesler Sts., Seattle 4, Wash., archts. CD 4/11—ENR 4/19.

Bids Asked May 16

N. C., Kinston—City, J. R. Sams, mayor and Bd. City Comrs., power plant improvements, W. C. Olsen, 5 Exchange Pl., Raleigh, consult. engr.

Bids Asked May 17

★†**N. J., Newark**—Newark Housing Auth., 57 Sussex Ave., 275 family dwelling units, N.J. 2-9, for NHA. $1,500,000. Plans deposit $50. Wm. E. Lehman, 972 Broad St., archt. CD 4/2—ENR 4/6.

Bids Asked About May 18

†**Ky., Paducah**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash. 25, D. C., 1 story part bsmnt., health center bldg., Ky. 15-17... S. Lester Daly, 704 E. 5 St., Metropolis, Ill., archt. CD 4/27.

Bids Asked May 29

★†**Mich., Dearborn**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., addnl. bldg., utilities, incl. Theatre Bldg. 22; O. T. Shops Bldg. 22, connecting corridors, etc. Proj. 2413. CD 3/22—ENR 3/29.

†**Wyo., Sheridan**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. D. C., Boiler House Bldg. No. 10, Incinerator Bldg. No. 91, Radial Brick Chimney No. 92, Coal Silo No. 93, Sewage Control House Bldg. No. 95; Pump House Bldg. No. 96, Trickling Filter No. 97, Secondary Sedimentation Tank No. 98, Dosing Tank No. 99, etc., Proj. Nos. 2246A and 2392.

Bids Asked May 30

†**Tex., San Antonio**—Reconstruction Finance Corp., 514 Alamo Bank Bldg., two 126x400 ft. storage warehouses. Over $100,000. K. Franzheim, A. B. Mills, 728-17 St. N.W., Wash., D. C., assoc. archts.

Bids Asked June 12

†**N. C., Fayetteville**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., Main Bldg. 1 addn., incl. roads, walks, grading, drainage, excav., rein.-con., hollow concrete units, hollow bldg. tile, outside services, etc., Proj. 2412. CD 12/18—ENR 12/21.

Bids Asked in July

La., Baton Rouge—State Dpt. Inst. A. P. Tugwell, treas., Baton Rouge, school for juvenile delinquents, near here, $350,000. CD 10/14/43—ENR 10/21/43.

Bids Asked About July 1

★†**N. Y., Peekskill**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., neuropsychiatric patient hospital, at Crugers Park, 2 mi. south of here. $5,790,000.

Bids Asked

†**N. C., Concord**—Cabarrus County Hospital, Concord, nurses home, $185,400. FWA, E. C. Flannagan, Henderson, archt. CD 11/30—ENR 12/7.

Bids Asked

Tex., Cypress—Cypress-Fairbanks Consolidated School Dist., brick, concrete, stone, rein.-con. school, $150,000. Plans deposit $10. Voelcker & Dixon, 2801 San Jacinto St., Houston, archts.

LOW BIDDERS

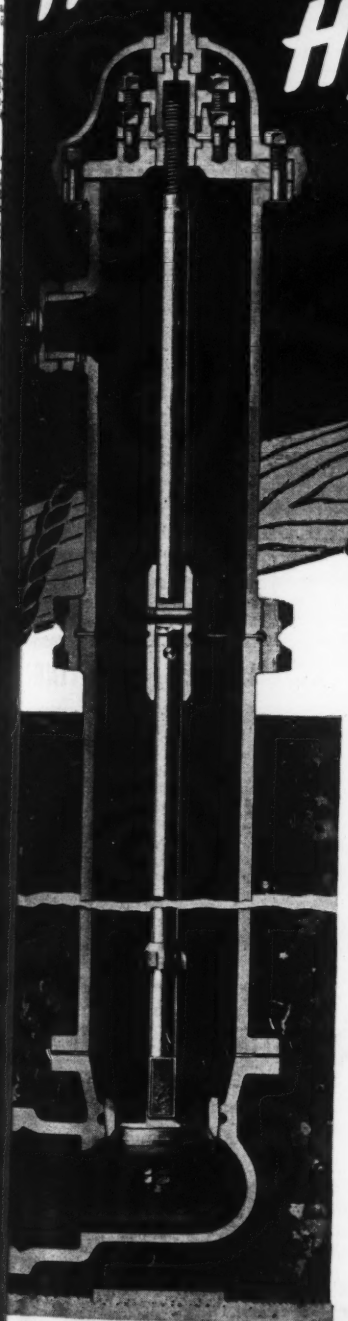
†**Calif., Pleasanton**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, Apt. 26, 188 family dwelling units, Calif. 4988-N, from G. W. Williams Co., 10 California Drive, Burlingame, $399,775. CD 4/10—ENR 4/12.

†**Calif., Oxnard**—Pub. Housing Auth., NHA, 816 W. 5 St., Los Angeles, Apr. 12, 80 family dwelling units, Calif. 4054-N, from Jensen & Jensen, 9 St. and Ventura Rd., $162,313. CD 4/5.

†**Calif., Santa Barbara**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, Apr. 24, 70 family war dwelling units, Calif. 4027-N, from E. G. Martin, 1311 5 St., Los Angeles, $181,988. Soule & Murphy, 116 E. Sola St., archts. CD 3/26—ENR 3/29.

†**Calif., San Diego**—Pub. Housing Auth., NHA, 816 W. 5 St., Los Angeles, Apr. 14, 80 family war dwelling units, Calif. 4997-N, from Baruch Corp., 625 S. Olive St., Los Angeles, $211,900. CD 3/27—ENR 3/29.

The three R's of Hydrant Expenses Reduced by SAFETOP...



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SAFETOP Repairs in case of breakage by a colliding vehicle require parts costing only $6.00. In addition, no excavating is necessary and the hydrant can be returned to service by one man within half an hour.

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The cost of replacements to Kennedy SAFETOP parts is negligible throughout the life of the hydrant because of the high quality of materials and the durable construction. Moreover, the hydrant is frost-proof and tamper-proof so there is little likelihood of any parts being broken or stolen.

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PUBLIC BUILDINGS (Low Bidders, Cont'd.)

†**Calif., San Diego**—Pub. Housing Auth., NHA, 816 W. 5 St., Los Angeles, Apr. 20, 200 dwelling units, Calif. 4996-N, from E. A. Kaiser Co., 8825 Olympic Blvd., Beverly Hills, **$403,095.** CD 3/27—ENR 3/29.

★†**Calif., Stockton**—Pub Housing Auth., NHA, 760 Market St., San Francisco, Apr. 24, 200 temporary family dwelling units, Calif. 4978; 23 bldgs. housing 76 men, Calif. 4979; 50 family trailer units, Calif. 4981, from C. T. Lindsay, 824 Taraval St., San Francisco, **$532,832.** CD 4/5.

†**N. D., Fargo**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash., 25, D. C., Apr. 24, addnl. bldgs., utilities, proj. No. 2266 from Hagstrom Constr. Co., 490 Snelling Ave. N., St. Paul, Minn., $1,725,900. CD 3/12—ENR 3/15.

†**O., Dayton** — Reconstruction Finance Corp., Federal Reserve Bank Bldg., Cleveland, 125x1,000 ft., brick, steel warehouse, Kreitner Rd., from James I. Barnes Constr. Co., Talbott Bldg., **$266,800.** A. B. Mills, 728 17 St., Wash., D. C., archt.

Pa., Bedford—Bd. Educ., D. Reilly, pres., High School Bldg., Apr. 23, general contract 2 story, bsmnt., 59x203 ft., face brick on hollow tile backup, high school front addn., repairs, from Moyer Bros., 2603 Beale Ave., Altoona. **$155,000.** CD 4/10—ENR 4/12.

†**Wash., Kennewick**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash. 25, D. C., Apr. 24, 1 story, 242x430 ft., frame hospital, Wash. 45-299-N, from L. H. Hoffman, 715 S.W. Columbus St., Portland, Ore., **$393,500. FWA.** CD 4/2—ENR 4/5.

CONTRACTS AWARDED

†**Calif., Oakland** — Pub. Housing Auth., NHA, Phelan Bldg., San Francisco, nine 1 and 2 story bldg., containing 56 family dwelling units, servicing San Leandro and Oakland Naval Hospitals, Oak Knoll, Calif. 4909-N, to Equity Contg. Co., 2287 Telegraph Ave., Berkeley, **$138,350.** CD 4/20.

★†**Calif., San Diego**—Pub. Housing Auth., NHA, 816 W. 5 St., Los Angeles, 240 family dwelling units, Calif. 4037-N, to Dentzel & Whyte, 825 S. Date Ave., Alhambra, **$537,500.** CD 4/25, under LB.

†**Calif., Santa Ana**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., Homoja Housing development, NOY 11100, to Peter Kiewit Sons Co., 505 Quinby Bldg., Los Angeles.

★†**Calif., Vallejo**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, 92 family dwelling units, Calif. 4999-N, to Moore & Roberts, 693 Mission St., San Francisco, **$613,100.** CD 4/24—ENR 4/26, under LB.

★†**Conn., West Haven (br. New Haven)**—Armstrong Rubber Co., 475 Elm St., 4 story, sub-bsmnt., and 6 story, 180x240 ft., rein.-con. plant, Elm St., to Gilbans Bldg. Co., Inc., 90 Calverly St., Providence, R. I. Est. **$2,000,000.** Defense Plant Corp. will finance. Fletcher Thompson Inc., 211 State St., Bridgeport, engr. CD 4/17—ENR 4/19.

★†**Florida**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., 765 housing units, Miami, 50 housing units, Vero Beach, 160 housing units Fort Lauderdale, 40 housing units Richmond, 150 housing units, near Miami, 210 housing units, Miami, 155 housing units, Key West, NOY 12225, to Fred Howland, Inc., 114 Postal Bldg., Miami, Zone 6, **$2,300,000.** Twentieth Century Designers, 1530 Hendricks Ave., Jacksonville, archts. CD 3/28.

†**Fla., Daytona Beach**—U. S. Eng., Post Office Bldg., Savannah, Ga., 18 new bldgs., at Welch Convalescent Hospital, to Algernon Blair Co., First National Bank Bldg., Montgomery, Ala., **$300,000.** Bids 4/20.

★†**Ind., Charleston**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago 6, Ill., prefabrication and erection 600 portable family dwellings, Ind. 12206, to National Homes Inc., Lafayette, **$980,400.** CD 3/29—ENR 4/5.

†**Ind., Hammond**—Reconstruction Finance Corp., 208 S. LaSalle St., Chicago, Ill., 1 story, 450x1,500 ft., concrete block, steel warehouse, to R. C. Clark, **304 E.** Chicago Ave., East Chicago. **$332,816.**

Ia., Harlan—L. D. Billings, city clk., light plant imprvs., incl. Diesel engine, to Fulton Iron Works Co., 1259 Delaware St., St. Louis, Mo., **$104,301.** Bids 4/18.

Minn., New Ulm—City, Pub. Utilities Comn., A. C. Sannwald, secy., piping, accessories and equip., pump, closed heater, and electric work for 6000 kw. turbo-generator installation in municipal power plant, to Power Service Corp., 711 Wesley Temple Bldg., Minneapolis, **$85,925;** cooling tower to Marley Co., 1014 Wesley Temple Bldg., Minneapolis, **$20,645.** Bids 4/4. CD 3/28.

†**Mo., St. Louis**—Reconstruction Finance Corp., 407 N. 8 St., Zone 1, two 1 story, 259x1020 and 227x370 ft., masonry warehouses at 8900 S. Bway., to Alport-Carlo Constr. Co., Title Guaranty Bldg., Zone 1, approx. **$390,000.** Bids 4/16. K. F. Franzheim-A. B. Mills, 728 18 St. N.W., Wash., D. C., assoc. archts.

★**N. S., Halifax**—Dpt. P. Wks., Ottawa, Ont., Ross Miller Memorial Infirmary and power house bldg. at Camp Hill Hospital to E. G. M. Cape & Co., 620 Cathcart St., Montreal, Que., **$2,000,000.** Bids 4/18. CD 4/3—ENR 4/5.

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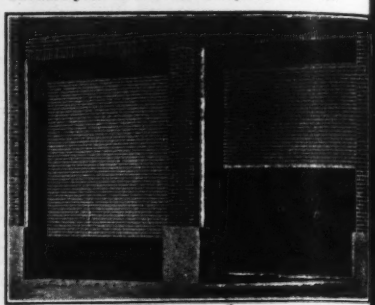

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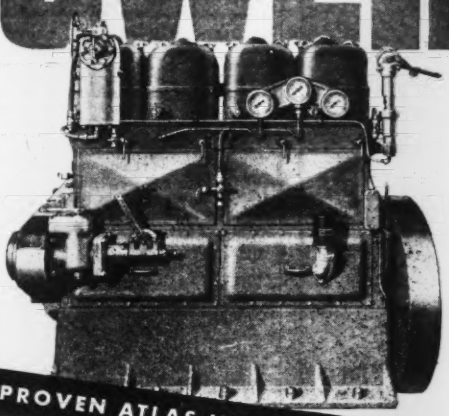

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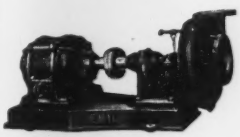

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Spring Tension — Less Wear

Maintains positive tension at all times sufficient to steady a clam shell bucket under any conditions. Functions perfectly with boom at any angle.

Operates on a spring principle. There are no weights, tracks, pins or carriages to wear out or get out of order. Large bearing and fewer sheaves save wear on cable.

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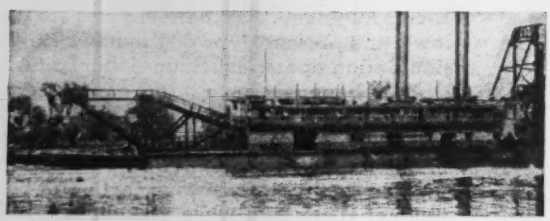

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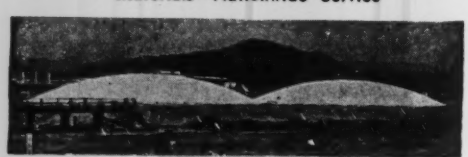

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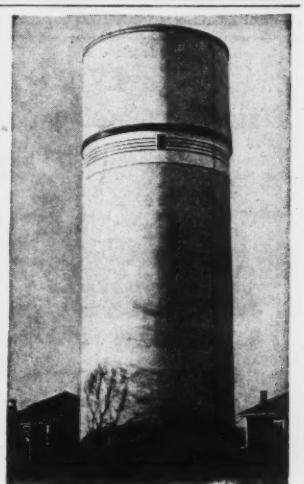

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BOSTON WASHINGTON MONTREAL

PUBLIC BUILDINGS (Contracts Awarded, Cont'd.)

★**†Ore., Portland**—U. S. Eng., Pittock Blk., one thousand five hundred 20x48 ft. plywood insulated barracks, to Timber Structures, Inc., 3400 N.W. Yeon St., $1,650,000. Awarded 4/18.

★**†Tex., Houston**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., 25, D. C., hospital auxiliary bldgs., utilities, facilities, etc., Spec. 15962, NOY 11662, to Jas. Stewart Corp., 6908 Alameda Rd., $3,347,304. CD 4/23, under LB.

Tex., Longview—H. P. Foster, supt. Schools, Longview, 1 story, part 2 story school, incl. cafeteria, shop, library, etc., to H. E. White, Tyler, $153,250. CD 4/10.

B. C., Vancouver—Dpt. National Defense, Ottawa, Ont., machine gun test range bldg., etc., to E. H. Shockley, 5611 Elm St., $105,945.

COMMERCIAL-BUILDINGS

PROPOSED WORK

Ala., Tuscaloosa—J. Warren Leach, 651 Woodley Rd., Montgomery, making plans fifty 1 story, frame residences. $250,000.

Ala., Tuscaloosa—John D. Leeland Ins. Co., 709 Greensboro Ave., making plans fifty 1 story, frame residences, $250,000.

Ala., Tuscaloosa—Morgan-Pritchett Co., 527 23 Ave., completed plans seventy-five 1 story, frame residences. $375,000.

Ala., Tuscaloosa—Pat Morrison Co., Tuscaloosa, making plans fifty 1 story frame residences. $250,000.

Ala., Tuscaloosa—H. E. Newton, 5131 7 St., making plans sixty 1 story, frame residences. $300,000.

★**Ala., Tuscaloosa**—Owen, Meredith & Sons, 2212 Broad St., making plans one hundred eighty-five 1 story, frame, brick residences. $925,000.

★**Calif., Long Beach**—Stevens Hotel Corp., 720 S. Michigan St., Chicago, Ill., 11 story, rein.-con. addn. Hilton Hotel, Ocean Blvd. and Locust Aves. $500,000. CD 1/18—ENR 1/25.

Calif., San Mateo—Long Realty Corp., 2300 Ralston Ave., 29 large residences on half acre homesites, in Hillsborough, $290,000.

Ill., Kewanee—Illinois Commercial Telephone Co., Illinois Bldg., Springfield, soon lets contract 3 story, 100x100 ft., brick, stone, concrete, steel central office bldg. J. A. Scribbens, 125½ Fremont St., archt.

★**Ind., Muncie**—Middletown Gardens Housing Co., R. G. Siferd, dir., Muncie, expanding housing to accommodate 111 families. $500,000.

La., New Orleans—Moise H. Goldstein & Assoc., archts., American Bank Bldg., 2 story, 35 x 135 ft. womens dormitory with 32 x 46 ft. wing on campus of Dillard University, for Dillard University, 2601 Gentilly Blvd. Plans deposit $25. CD 11/14—ENR 11/16.

Pa., Grove City—George Jr. Republic, A. T. Prasse, pres., Grove City, sketches completed by L. H. Thayer, Oak Hill Farms, Glenshaw, 2 story, bsmnt., 22x40 ft. frame infirmary addn., gymnasium, dining hall, 2 story, bsmnt., frame dormitory. $150,000.

★**Pa., McKeesport**—McKeesport Hospital, R. M. Baldridge, vice pres. Bd. Trustees, J. J. Boax, chn. Bldg. Comn., 1500 5 Ave., 8 story, bsmnt., 150x230 ft., brick, steel hospital addn. $600,000.

Pa., Norristown—Montgomery Hospital, N. D. Wright, chn. Bldg. Comn., 1734 DeKalb St., working drawings nearing completion by Ballinger Co., 105 S. 12 St., Phila., 6 story, brick hospital annex. $160,000.

★**Pa., Phila.**—Temple University Hospital, Broad and Ontario Sts., plans by Zantzinger & Borie, 1531 Locust St., hospital bldg. $5,000,000. Applied for FWA funds. CD 11/20—ENR 11/23.

Pa., Uniontown—Uniontown Hospital Assn., J. Farrell, supt., W. Berkely St., plans by E. R. Johnson, 24 Robinson St., brick, steel nurses home. $200,000.

Alaska, Juneau—Goldstein Imprv. Co., Juneau, plans by H. D. Foss, P. O. 2623, 5 story, bsmnt., rein.-con., office bldg., replacing struture destroyed by fire. $250,000. CD 4/25.

★**Ont., Toronto**—Institute of Modern Residential Planning, c/o J. A. Murray, archt., 63 W. Charles St., 150 dwellings. $900,000.

Que., Riviere du Loup—Reverend Sisters of Providence, Riviere du Loup, hospital. $175,000.

BIDS ASKED

Bids Asked May 7

Conn., Newington—Newington Home for Crippled Children, Cedar St., brick, steel, surgical and isolation hospital addn. $150,000. Ebbets & Frid, 15 Lewis St., Hartford, archts. CD 3/7—ENR 3/15.

Bids Asked

Ill., Chicago—Dubin & Dubin, archts., 127 N. Dearborn St., rebuilding 2 story, 50 x 122 ft., brick recreation bldg., containing 12 bowling alleys, etc., for Bowl-Haven, Inc., 1103 W. Bryn Mawr Ave.

COMMERCIAL BUILDINGS (Cont'd.)

LOW BIDDERS

Tex., Houston—Hedrick & Lindsley, archts., 811 So. Standard Bldg., Apr. 27, 3 story, bsmnt., rein.-con., hollow tile hospital, etc., incl. boiler house and laundry plant, for Sisters of Immaculate Conception, St. Elizabeth Hospital, Elizabeth St., from Linbeck & Dederick, 2017 W. Gray St., **$291,983.** CD 4/17—ENR 4/19.

CONTRACTS AWARDED

★**Calif., Hermosa Beach and Manhattan Beach** — Frodsham Constr. Co., 2508 Strand St., Manhattan Beach, 152 frame, stucco dwellings. Owner builds. **$625,000.**

R. I., Cranston—General Engineering & Contg. Co., 32 Bway., Providence, **30** five room residences, near Oaklawn **Ave.** Owner builds. **$150,000.** D. T. Russillo, **37** Rowan St., Providence, archt.

R. I., Pawtucket—E. W. Taylor, 844 Broad St., Providence, 50 unit frame **residences.** Owner builds. **$260,000.**

R. I., Warwick—American **Home Builders,** 74 Brookside Dr., Cranston, 100 **four and-five** room residences, West Shore Rd., to **J. Mancolillo,** 74 Brookside Dr., Cranston, **approx. $400,000.**

★**R. I., Warwick**—Nazzareno Meloccaro, 85 Legion Way, Providence, 128 brick, wood residential development, Roger Williams Terrace, Owner builds, **$700,000.** O. O. Gauvin, 72 Weybosset St., Providence, archt.

★**Tex., Houston**—Commercial Realty Co., Lucille Pl., 51 duplexes, concrete slab fdns., etc. Owner builds. **$750,000.** CD 4/18—ENR 4/26.

★**O., Barberton** — FACTORY — Hercules Motor Corp., Barberton, 2 story, 90x160 ft., structural steel factory addn. $550,000.

★**O., Dayton**—PLANT—Delco Prod. Co., Div. General Motors Corp., 307 General Motors Bldg., Detroit, Mich., plans by Argonaut Realty Co., General Motors Bldg., Detroit, Mich., 6 story, 180 x 180 ft., brick, steel, concrete addn. E. 1 and N. Sears Sts., $1,250,000.

★**O., Findlay**—PLANT—Master Tire & Rubber Corp., J. F. Schaefer, pres., Findlay, 100x240 ft., brick, steel truck tire plant addn. $650,000. Austin Co., 16112 Euclid Ave., Cleveland, engr.-archt.

★**O., Portsmouth**—PLANT—Wheeling Steel Corp., Portsmouth, plant expan., rehabilitate present plant, install new equip. $4,500,000.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Azusa — WAREHOUSES — Aerojet Engineering Co., 285 W. Colorado St., Pasadena, 3 warehouse bldgs., consisting two frame, stucco and one rein.-con., 116x224 ft., 78x263 and 146x306 ft., to J. O. Oltmans & Son, 810 E. 18 St., Los Angeles, **$160,000.** J. N. Fleming, 1129 Melrose Ave., Glendale, archt.

Conn., Danielson—PLANT—Prefabricating Constr. Co., Dayville, Danielson, 1 story, 40x100 ft., concrete plant addns., Wildwood Park, to Baker & Johnson Co., 261 Richmond St., Providence, R. I. Est. **$40,000.** CD 4/18—ENR 4/26.

Conn., East Hartford—CELLS—Pratt & Whitney Div. United Aircraft Corp., 400 Main St., jet cooling construction 18 engine test cells, to Wadhams & May Co., 15 Lewis St., Hartford. Est. **$40,000.** CD 4/4—ENR 4/12.

Conn., Hamden — PLANT — Connecticut Metal & Finishing Co., Haig St., 1 story, 100x150 ft., brick, steel plant, incl. mezzanine, Haig St., to Mott-Mohr Constr. Co., Inc., 440 Elm St., New Haven. Est. **$75,000.** CD 4/16—ENR 4/19.

Conn., New Britain—FACTORY—Connecticut Stamping & Binding Co., 34 Meadow St., 1 story, 75x200 ft., brick, concrete factory, Newington Ave., to P. A. Keith, 1064 Main St., Newington. Est. **$60,000.** CD 4/23—ENR 4/26.

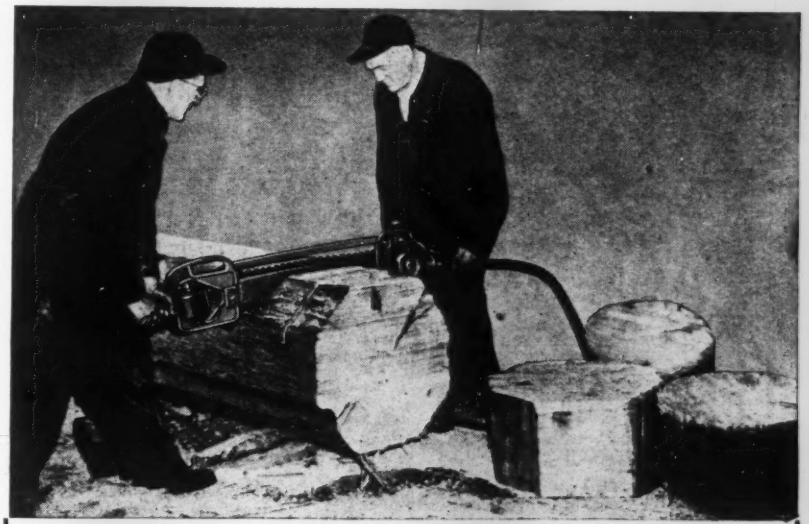
Conn., New Britain—WAREHOUSE—Landers, Frary & Clark, 47 Center St., brick warehouse, to E. J. Pinney Co., 220 Dwight St., Springfield. Est. **$50,000.** D. K. Perry, 17 Court St., archt.

★**Ga., Atlanta**—SHOP—Southern Ry. System, B. Herman, ch. engr., McPherson Sq., Wash. 13, D. C., 1 story, 100 x 250 ft., brick, concrete Diesel locomotive repair shop having traveling overhead crane and 4 tracks. $500,000.

Ill., Chicago — FACTORY — Zenith Radio Corp., 6001 W. Dickens St., soon lets contract 1 story, 60 x 600 ft., brick, concrete, steel factory. Alschuler & Freidman, 28 E. Jackson Blvd., archts.

La., Abbeville—PLANT—L. M. Thomas, Abbeville, frozen food locker plant. Owner builds. **$40,000.** CD 12/12—ENR 12/14.

Md., Baltimore—PLANT BLDGS.—Rustless Steel & Iron Corp., 3400 E. Chase St., one 2 story, 71x94 ft. and 3 story, 114x125 ft., brick, steel mfg. bldg. addns., to Cummins Hart Constr. Co., 2023 N. Charles St., **$300,000.**



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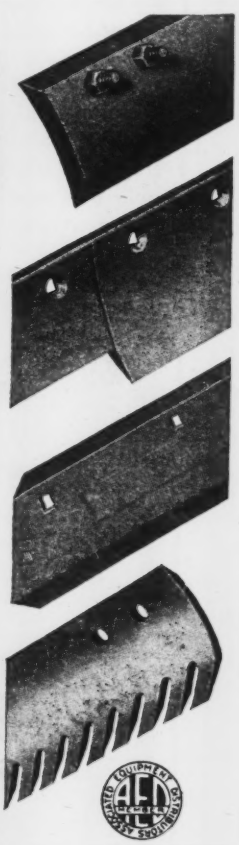

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INDUSTRIAL BUILDINGS (Proposed Work Cont'd.)

Ore., Oregon City — SLAUGHTERHOUSE, etc.—Oregon Livestock Cooperative, J. G. Kasaner, secy., Oregon City, plans by Annand & Kennedy, Central Bldg., Portland, slaughterhouse, processing and packing plant and stock yards. $100,000.

Ore., Portland—PLANT—General Mills, Inc., Sperry Div., 180 New Montgomery St., San Francisco, Calif., plans by Ertz & Burns, Pittock Blk., remodeling, altering bldg., 139 S.E. Washington St., providing warehouse space. $48,993.

Pa., Pittsburgh—BAKERY—Rhea's Inc., 441 Market St., plans by McCormick Co. Inc., 121-27 S. Negley Ave., altering bakery. $160,000.

Pa., Wilmerding — FOUNDRY — Westinghouse Air Brake Co., W. C. Landis, works mgr., Wilmerding, plans c.i. foundry. E. E. Hewitt, Wilmerding, ch. engr.

Tex., Edinburg—PLANT—Golden Jersey Creamery, Edinburg, 104x68 ft. and 25x104 ft., hollow tile, brick, concrete creamery plant bldgs. Over $40,000.

Tex., Dallas—SHOP and STORAGE—At office R. D. Goodwin, archt., Construction Bldg., soon lets contract 1 story, bsmnt., 240 x 300 ft., brick, steel, rein.-con. mechanical shop and storage bldg., for Bankston-Hall Motors, 2311 Main St. $150,000. CD 3/1—ENR 3/8.

Tex., San Antonio — PLANT — Finesilver Mfg. Co., 816 Cameron St., bids soon mfg. plant. $60,000. J. M. Marriott, 220 Frost Bank Bldg., engr. CD 4/30.

Tex., San Antonio—SHOP, etc.—Bedell Trailer Sales Co., S. Flores and Clay Sts., shop and warehouse. $40,000. W. E. Simpson Co., 1445 Milam Bldg., engrs.

★**Tex., Yoakum**—PLANT—Shell Oil Co., Shell Bldg., Houston, recycling plant. $2,000,000.

Wash., Bingen—PLANT BLDGS., etc.—Twin Harbors Lumber Co., Bingen, two 75 x 250 ft. production bldgs.; 50 x 200 ft. bldg., housing steel treatment tanks; stockroom and boiler house replacing structures destroyed by fire, $75,000.

Wis., Adell—PLANT—Western Condensing Co., 935 St. John St., Appleton, revised plans for processing plant, 1 story, 20x100 ft., structural steel, galvanized iron, processing plant, concrete fdn. Orbison & Orbison, 206 W. College Ave., Appleton, engrs.

Wis., Blair—MILL—P. Olsen, Blair, 1 story, part bsmnt., 50x90 ft., rein.-con., tile, structural steel feed mill. R. M. Connelly, P. O. Box 84, Appleton, engr.

Wis., Waukesha—ASSEMBLING—Waukesha Motor Co., Waukesha, plans by P. G. Schley, consult. archt., 2309 E. Glendale Ave., Milwaukee, Zone 11, 3 story, 66x368 ft., rein.-con., steel, brick assembling bldg., concrete fdn.

BIDS ASKED

Bids Asked May 7

Ont., Weston—PLANT—Moffatt's Ltd., 31 Dennison Ave., 1 story, 140 x 240 ft., brick, steel plant addn. $85,000. Prack & Prack, 36 James St., Hamilton, archts. CD 12/11—ENR 1/14.

Bids Asked May 9

★**Ont., St. Thomas**—PLANT—Prack & Prack, archts., 36 James St. S., Hamilton, plant in eastern outskirts of city, for Timken Roller Bearing Co., 1835 Dueber Ave. S., Canton, O., U. S. A. A. L. Bergstrom, c/o owner, engr. $600,000. CD 12/11—ENR 12/21.

Bids Asked May 15

★**N. J., Kearny (br. Arlington)**—PLANT—Congoleum Nairn, Inc., 295 5 Ave., New York 16, N. Y., rebuilding mfg. bldg. $3,000,000. Albert Kahn Associated Architects & Engineers, Inc., 345 New Center Bldg., Detroit, Mich., archts. CD 8/17—ENR 8/24.

Bids Asked Probably in May

Pa., Midland—PLANT—Crucible Steel Co. of America (Blank Div.), A. L. Sonhalter, vice pres., Midland, 1 story, brick, steel, mfg. plant addn. $480,000 incl. equip.

Bids Asked

Conn., Norwalk—BOILER PLANT, etc.—Norwalk Tire & Rubber Co., Winnepauk, Norwalk, 2 story, 50 x 100 ft., brick, steel boiler plant and administration bldg. addn. Over $40,000. Bids May 1 for structural steel. Fletcher Thompson, Inc., 211 State St., Bridgeport, engr.

Mass., Worcester — STORAGE UNIT — S. Finkelstein, 233 May St., 2 story, brick storage unit, Burt St. $45,000. J. Swartz, 37 Derby St., archt.

Me., Ellsworth—PLANT—H. Phillips, 193 Main St., remodeling bldg. for quick freeze plant. $100,000, incl. equip.

Tex., Raymondville—PLANT—D. W. Jones, c/o Hecht-Campbell, Inc., 228 S. 7 St., Raymondville, ice plant. $40,000. CD 3/14—ENR 3/22.

Tex., Odessa—PLANT—Air Products Co., Odessa, charging plant. $40,000.

CONTRACTS AWARDED

Ariz., Phoenix—REPAIR and SALES—Neil B. McGinnis Co., 1401 S. Central Ave., repair and sales bldg., to Bridgeman Constr. Co., Phoenix, Est. $70,000. Gilmore & Varney, Luhrs Tower, archts.

INDUSTRIAL BUILDINGS (Contracts Awarded, Cont'd.)

Mass., Woburn—PLANT—Aberjona Packing Div., Blue Point Corp. of General Foods, New Boston Ave., 2 story, main unit and pumphouse, dehydrating plant, rebuilding machine shop, processing plant, to F. Leroy Fox, Inc., 101 Milk St., Boston. Est. **$100,000.** CD 4/26/44—ENR 5/11/44.

Mo., St. Louis — WAREHOUSE — Maurice Realty Co., 20 and Tracy Sts., Kansas City, Mo., 2 story, 50 x 100 ft., brick, concrete warehouse addn., 4410 Hunt Ave., to Moeller Constr. Co., 3007 Wyoming St., Zone 16. Est. **$40,000** plus with equip. L. Haeger, 1344 Utah Pl., Zone 16, archt.

N. J., Camden—PLANT—Eavenson & Levering Co., 301 Jackson St., mfg. plant addn., to Jack S. Steele Co., 1316 Arch St., Phila., Pa., **$75,000.** Awarded 4/20.

N. M., Clovis—ROUNDHOUSE—Atchison, Topeka & Santa Fe Ry. Co., J. A. Noble, ch. engr. (western lines) Amarillo, Tex., brick, concrete roundhouse unit. Owner builds. **$80,000.** CD 1/4—ENR 1/11.

O., Dayton—STORAGE—Frigidaire Corp., div. General Motors Corp., General Motors Bldg., Detroit, Mich., porcelain material storage bldg. addn., at Moraine City, near here, to Industrial Building Co., Reibold Bldg., **$90,000.** Shenck & Williams, 3rd Natl. Bank Bldg., archt.

Ore., Portland — WAREHOUSE — General Mills, Sperry Div., 180 New Montgomery St., San Francisco, Calif., warehouse addn., to Tom Burns & Co., 222 Pittock Blk., **$48,903.** Awarded 4/21.

Pa., Phila.—FREIGHT STATION—The Pennsylvania R.R., J. L. Cressitt, ch. engr., Broad St. Station Bldg., 1617 Pennsylvania Blvd., Zone 4, freight station addn., Tioga and D Sts., to Murphy Quigley & Co., 1518 Samsom St., **$100,000.** Awarded 4/18.

R. I., Central Falls—PLANT UNIT—General Products Co., 15 Elbow St., Providence, 2 story, bsmnt., 40x40 ft., concrete, brick engineering bldg., to Central Engr. & Constr. Co., 210 Main St., Pawtucket, approx. **$40,000.** Dwight Seabury Co., 188 Main St., Pawtucket, archts. CD 3/5—ENR 3/8.

Tex., Houston—PLANT—Garrott Brass & Machine Co., 1718 Ennis St., brass plant addn., to Bace Marshall Constr. Co., 4009 Center St., **$52,250.** E. Werlin, 3501 Buffalo St., archt.

Tex., Monte Alto — PLANT — Mid-Valley Cooperative Canning Co., c/o Rio Farms, Inc., Edcouch, 1 story, 100x200 ft., brick, rein.-con. processing plant, 1 story 100x200 ft. citrus and vegetable packing plant, frame, sheet metal, concrete, force account. **$40,000** each. CD 4/12—ENR 4/19.

Tex., Orange—PLANT—Garrott Brass & Machine Co., Inc., 1718 Ennis St., Houston, plant addn., to Bace-Marshall Const. Co., 4009 Center St., Houston, **$53,000.**

Tex., Port Arthur—PLANT—Port Arthur News. Port Arthur, news plant, to A. L. Hays, Port Arthur, **$44,334.** N. Stewart, Adams Bldg., archt.

Wis., Antigo — POWER HOUSE — Antigo Milk Products Corp., Antigo, 1 and 2 story, 63 x 103 ft., structural steel, rein.-con., brick power house, to Hoffman Const. Co., 1519 N. Oneida St., Appleton. CD 4/4—ENR 4/12.

Wis., Milwaukee—PLANT—Heil Co., 3000 W. Montana St., Zone 7, design and construction 1 story, 88 x 400 ft., steel, brick, steel processing plant addn., concrete fdn., to Klug & Smith Co., 111 E. Wisconsin Ave., Zone 2. Est. **$140,000.**

★**W. Va., Moundsville**—PLANT—Carboloy Co., Inc., 11177 E. Eight Mile Rd., Detroit, Mich., tungsten ore reducing plant on 72 acre site at Natrium, to Geo. A. Fuller Corp., 597 Madison Ave., New York, N. Y., Est. **$6,000,000** with equip. Smith-Hinchman & Grylls, Inc., 800 Marquette Bldg., Detroit, Mich., engr.

★**Ont., Aylmer**—PLANT—Imperial Tobacco Co., Ltd., 3810 St. Antoine St., Montreal, Que., tobacco processing plant, to Pigott Constr. Co., Ltd., Pigott Bldg., 36 James St. S., Hamilton, about **$1,500,000.** CD 3/29—ENR 4/5.

UNCLASSIFIED

BIDS ASKED

Bids Asked May 11

Montana—POWER LINE—Beartooth Electric Cooperative, Red Lodge, 82.77 mi. power line, Mont. 5019-B1, Carbon, Stillwater and Sweet Grass Counties. Plans deposit $25. T. Karkainen, Armory Bldg., Helena, engr. CD 4/5—ENR 4/12.

Bids Asked May 15

†**Tenn., Memphis**—INSTRUMENT LANDING SYSTEM—Civil Aeronautics Admin., 84 Marietta St. N.W., Atlanta, Ga., instrument landing sys. at municipal airport. Prop. 25-335.

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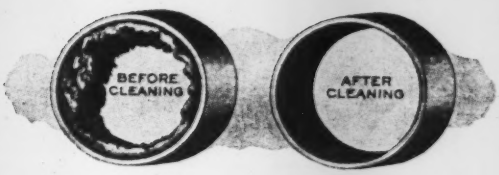

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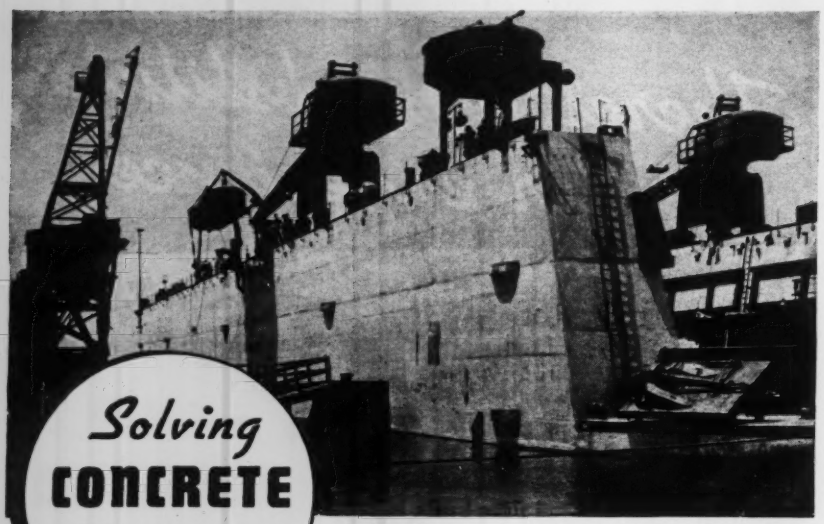

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UNCLASSIFIED (Bids Asked, Cont'd.)

Louisiana—GAS LINE—Southern Natural Gas Co., City Natl. Bank Bldg., Shreveport, 125 mi. looping main gas line between Logansport and Monroe. $375,000. CD 8/23—ENR 8/31, under Logansport, La.

LOW BIDDERS

†Calif., Fairfield—RUNWAYS, etc.—U. S. Eng., 1209 8 St., Sacramento, Zone 5, Apr. 24, repairing runways, taxiways and aprons, Fairfield-Suisum Air Base, Spec. 1092, from Marshall S. Hanrahan & H. Earl Parker, Box 429, Redwood City, **$68,670.**

★**†Calif., Mills Field**—AIRFIELD PAVING, etc.—U. S. Eng., 74 New Montgomery St., San Francisco, paving, drainage and lighting, Spec. 1563, from Macco Constr. Co. and Morrison-Knudsen, Inc., 111 Sutter St., San Francisco, **$939,365.**

Calif., San Pedro—SHIPYARD IMPRVS.—Todd Shipyards Corp., P.O. Box 231, Apr. 19, general development at plant, incl. storm drains, paving, fence and railroad tracks, from Guy F. Atkinson Co., 1103 Heartwell Bldg., Long Beach, **$118,895.**

†O., Dayton—SPRINKLER SYSTEM—U. S. Eng., 522 Post Office & Court House, Cincinnati, Apr. 3, installing automatic sprinkler sys. in Bldg. 124, at Wright Field from Automatic Sprinkler Co. of America, Brittain St., Youngstown, **$185,520.**

CONTRACTS AWARDED

†Calif., Stockton—HANGARS, etc.—U. S. Eng., 1209 8 St., Sacramento, 3 nose hangars, conversion barracks, utilities at Stockton Air Field, Spec. 1096, to T. C. Buck, Box 407, **$80,853.**

†Conn., Avon—SWIMMING POOL—U. S. Eng., 31 St. James Ave., Boston, Mass., swimming pool, Old Farms Convalescent Hospital, to Wadhams & May Co., 15 Lewis St., Hartford. Est. **$50,000.** Strickland & Strickland, 71 Newbury St., Boston, Mass., and A. Hutton Vignole, Avon, archts.

★**Florida**—RAILWAY—Florida East Coast Ry. Co., L. C. Frohman, ch. engr., St. Augustine, 30 mi. branch railway line from Okeechobee City to Fort Pierce to join main line, own forces. **$1,500,000.**

†Ga., Warner Robins (br. Macon)—PARACHUTE DRYING TOWER, etc.—U. S. Eng., Post Office Bldg., Savannah, parachute drying tower and shed over engine test stands at Robins Field, to Stillwell Constr. Co., Macon, **$51,037.**

Kansas—RURAL ELECTRIFICATIONS—P. R. & W. Electric Cooperative Assn., Wamego, 27 mi. rural electrification, Pottawatomie Co., to J. R. Foree Contg. Co., National Bank of Topeka Bldg., Topeka, approx. **$25,000.** CD 1/18—ENR 1/25.

Mo., St. Louis—STREET LIGHTING—City, M. M. Kinsey, pres. Bd. P. Serv., 304 City Hall, Zone 1, street lighting maintenance, to G. L. Tarlton Contractors, Inc., Continental Bldg., 3617 Olive St., Zone 8. Est. **$49,500.**

Nebraska — TRANSMISSION LINES — Central Nebraska Power & Irrigation Dist., Hastings, transmission lines, near Hastings, to Crawford Electric Co., North Platte, **$32,317.** Bids 4/9.

†N. J., Fort Dix (br. Trenton)—ATHLETIC FACILITIES—U. S. Eng., 120 Wall St., New York 5, N. Y., athletic facilities, to R. B. Jaggard Engr. Co., Highland Ave., Westmont. **$36,695.**

†N. Y., Brentwood — ATHLETIC FACILITIES—U. S. Eng., 120 Wall St., New York, Zone 5, athletic facilities, to Kenney & Finnerty, Inc., 50 Ave. and Vernon Blvd., Long Island City. **$38,700.**

†N. C., Camp Butner (br. Durham)—PLATFORM, etc.—U. S. Eng., Post Office Bldg., Savannah, Ga., ambulance platform, paving and fire station, to Wm. Muirhead Constr. Co., Durham, **$159,018.**

Pa., Phila.—AIRPORT GRADING, etc.—City, Dpt. P. Wks., J. H. Neeson, dir., City Hall Annex, Northeast Airport grading, drainage, paving, to James D. Morrissey, 9119 Frankford Ave., **$66,866.** Bids 4/16, awarded 4/20.

Texas—RURAL ELECTRIC LINES—Cap Rock Elec. Coop., Inc., Stanton, 100 mi. rural electric lines, Martin Co., to Eugene Ashe Elec. Co., 415 Jones St., Fort Worth, **$72,647.** CD 4/19—ENR 4/27.

†Tex., Eagle Mountain Lake (br. Fort Worth)—AIR STATION LIGHTING SYS. T2M—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., permanent airport field lighting sys., Marine Corps Air Station, NOY 10860, to Libecap Electric Co., 208 S. Haskell Ave., Dallas, **$28,333.**

†Tex., Randolph Field—AIRFIELD CONSTRUCTION—U. S. Eng., Fort Sam Houston, addnl. airfield construction, to M. B. Killian & E. B. Darby, P. O. Box 1981, San Antonio, **$433,388.**

Tex., Tyler — OIL PIPELINE — Humble Pipe Line Co., Humble Bldg., Houston, 9 mi. 8 in. welded steel crude oil pipeline, own forces. **$70,000.** CD 4/11—ENR 4/19.

Proposal Advertisement see p. 257 & 276
Postwar Projects see p. 196

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